

## Implications of the Russian War on Ukraine for Climate Policy and the Geopolitics of Energy

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### Abstract

The February 2022 Russian invasion of Ukraine has led to radical changes in European energy politics and placed new urgency on plans to expand renewable energy and enhance energy efficiency. The European Union, the United States, and many other states have slapped a series of crippling sanctions on Russia and reduced or completely cut their fossil fuel imports in an effort to stop the cash flow the Kremlin needs to finance its war. Russian fossil fuel is being replaced by imports from other regions while demand has been reduced through energy savings by households and businesses. Putin's aggression against Ukraine has forced Europe to speed up its energy transition, meaning that Russia has unintentionally spurred on European climate policy. China, on the other hand, is deepening its trade ties with Russia, supporting the country by buying more oil and gas. New alliances are forming that will have long-term consequences for the geopolitics of energy and could also affect the potential for further cooperation on climate change globally.

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## Introduction<sup>1</sup>

On February 24, 2022, Russian forces launched a full-scale attack on Ukraine. The war has evolved into the deadliest conflict Europe has witnessed since the end of World War II.<sup>2</sup> After years of increasing economic trade and investment, cultural exchange, and international cooperation, Russia's renewed aggression has put previous Russian territorial incursions into a new light. When Russia launched a military campaign in Georgia in 2008, backing separatists in the breakaway region of South Ossetia and pushing Georgian nationals out of the area, the global response was muted. For Russia, this was interpreted as a green light to pursue further territorial goals, given that there appeared to be little Western appetite to take steps that would cause themselves much pain (Dickinson 2021). In 2014, the Russian Federation took control of and illegally annexed the Crimean Peninsula in southern Ukraine. The US, Europe, and Canada introduced sanctions in response to the annexation of Crimea, but these proved insufficient to prevent further aggression (Ashford 2016). Russian-backed separatists subsequently led an insurgency in Donetsk and Luhansk oblasts (provinces) in eastern Ukraine.

Along with the 2022 invasion of Ukraine, the Kremlin sought to turn energy into a political weapon. Gazprom, a majority state-owned Russian energy giant, reduced its flow of gas to Europe, presumably with the aim of convincing Europe to accept Russia's expansionist territorial aims. Amidst these developments, European decision makers had to scramble to assure European energy demand could be met and a deep and painful recession avoided.

By restricting gas flow to the West, Putin most likely presumed Europe would cave in and accept its take-over of Ukraine in order to maintain access to cheap sources of fossil fuel for its industries and citizens. Instead, as will be demonstrated below, Russia's 2022 aggression invited a much more formidable response from the West than its earlier territorial incursions, with major geopolitical and economic security ramifications. Putin clearly miscalculated when he combined his attack on Ukraine with reduced flows of energy to heavily energy-import dependent Europe. By seeking to use energy as a political weapon, Putin strengthened NATO and led to a rethinking of the meaning of energy security in Europe.

In response to the Kremlin's attack on Ukrainian sovereignty, the European Union, the United States, Canada, Japan, South Korea, Australia, New Zealand, and numerous other countries have slapped a series of increasingly harsh sanctions on Russian businesses and select Russian nationals with the intention of weakening Russia's capacity to finance and supply its military. They have restricted exports of sensitive technologies to Russia and armed Ukraine to defend itself. EU Member States Finland and Sweden both chose to give up their neutrality and applied to become members of NATO (Chatterjee 2023). Finland was admitted to NATO on April 4, 2023, while Sweden's accession is still pending.

As will be discussed below, security crises can be triggers of major policy changes in a wide variety of areas. In response to the energy crisis created by the war, European policymakers have made major changes to energy policies at the EU level. There have also been significant and, at times, surprising amendments made to individual European states' climate and energy policies and programs. More ambitious renewable energy targets, accelerated greenhouse gas reduction timetables, new clean energy innovation support mechanisms and regulations, and energy trade agreements have been established. There have also been major shifts in energy trade flows with significant geopolitical implications. The direct and indirect impacts of the war on global greenhouse gas emission trends and the international climate negotiations are also

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<sup>2</sup> In the first year of the war (through June 4, 2023), the United Nations Office of the High Commissioner for Human Rights (OHCHR) recorded 24,425 civilian casualties in Ukraine: 8,983 killed and 15,442 injured (OHCHR 2023). In addition, many tens of thousands of military personnel have been killed or injured.

significant. In what follows, these points will be examined with a focus on how the Ukraine-Russia war has impacted the energy and climate policies of the European Union and three of its largest Member States: Germany, France, and Poland. In addition, the impacts of the war on trans-Atlantic energy trade ties, Russia-China relations, Ukraine's integration into Europe, and regional and global climate policies will be explored.

### **Security Crises as a Driver of Policy Change**

Theoretically, the Russian invasion of Ukraine shows how an international security crisis can have far-reaching and reverberating policy impacts. In response to a security crisis, not only may geopolitical relations and alliances be reevaluated, but there may also be changes in policy areas not directly tied to the crisis, such as when pandemics and wars drive energy policy change (Siddi 2023; Steffen and Patt 2022; Zacheri et al. 2022). Indeed, the Russian war against Ukraine has led to major policy changes in European energy and climate policies. The tragedy of war has forced European decision makers to alter policies in the energy sector that go well beyond the already quite substantial changes they had made in recent years in response to the climate crisis. Since the 2022 Russian invasion of Ukraine, there has been further acceleration and accumulation of new regulations (Knill and Steinebach 2021). These aim to enhance European energy security while reducing Europe's climate footprint.

Of course, not all crises lead to policy changes. History is filled with crises that led to little or no change in policy directions or ambitions. The 2014 Russian invasion and annexation of Crimea did not lead to the same intensity of reaction from Europe (Ikani 2021) as the 2022 invasion has, although with some differences across EU Member States. What appears different now is not only a greater threat perception on the part of many EU Member States after Russia attempted to take Ukraine's capital, Kyiv, at the start of the war but also that many actors saw in this crisis possibilities to bring about changes to policies that otherwise might have taken years or even decades to achieve, if they would be achievable at all. These include the strengthening of the North Atlantic Treaty Organization (NATO) alliance, new energy trade arrangements across the Atlantic (Hammelehle 2023), and stronger climate policies (Samandari et al. 2022).

The 2022 Russian invasion of Ukraine also suggests that the direction and intensity of policy change will depend on the availability and fit of alternative policy ideas as well as whether there are actors (political entrepreneurs) with the power and skills needed to take these ideas and steer them through the maze of potential obstacles, which could stand in the way of their adoption. Policy entrepreneurs must be there to present decision makers with potential solutions to the crisis; political entrepreneurs must take these ideas and run with them. Which political parties are in power, how strong coalitions for change are, and how dominant actors backing the status quo are can matter. Political entrepreneurs must see a potentially workable idea and know how to quickly build a support coalition behind it. They must also have a sufficient understanding of policy-making processes to know how to bring their ideas onto the agenda while the window of opportunity created by the crisis is still open (Hogan and Feeney 2012; Hwang and Powell 2005). Building sufficient support behind an idea among key actors is critical. This process can be aided by decision makers' need to show their publics they are taking action.

Efforts to bring about policy change are likely to fail, however, if infighting between groups with different political or economic interests cannot be held at bay (Berman 2020). In the case of a complex, multi-level institutional structure such as the European Union, major policy change may need to be pursued simultaneously by multiple policy and political entrepreneurs who, with greater or lesser degrees of coordination, work across multiple governance levels to pursue their policy interests (Schreurs and Tiberghien 2007).

## European Energy Politics and Policy

Vladimir Putin's decision to invade Ukraine in 2022 became a trigger for far-reaching energy and climate policy changes in Europe and beyond. As discussed in greater detail below, what is quite astounding is that despite the frailty the European Union had shown in previous years, most notably with Brexit, political entrepreneurs at the national and European levels succeeded in finding ways to push through a series of policy reforms that are simultaneously breaking European dependence on Russian fossil fuels, reducing European greenhouse gas emissions, and giving a boost to Europe's clean energy industries. Riding on the back of the COVID-19 pandemic, which itself ushered in many changes in work patterns and digital communication, the 2022 war in Ukraine has forced Europe to once again rethink its energy strategies. For those concerned with climate change, the war led to fears about a rise in greenhouse gas emissions but also presented an opportunity to turn away from fossil fuels, push for more far-reaching climate policies, and move up emission reduction target dates.

### *European Dependence on Russian Fossil Fuels*

Europe produces only about 40-45 percent of its own energy, importing the remainder. The level of dependency on imports has expanded with time but varies significantly across the EU. Several of the EU's smaller Member States are almost completely dependent on imports (e.g., Cyprus, Luxembourg and Malta) to meet their energy needs. Dependency levels are also high in the biggest economies in the EU. In 2019, Germany imported 67 percent of its energy, with just a slight decline to 63.7 percent in 2020. In 2020, dependency levels were in the mid-40 percent range for France, Denmark, and Poland, 68 percent for Spain, and 73.5 percent for Italy. Only a handful of EU Member States had import dependencies below the 40 percent mark: Czech Republic, Bulgaria, Romania, Sweden, and Estonia (Eurostat 2023a).

At the start of the 2020s, Russia was the world's largest exporter of gas and the second largest exporter of oil after Saudi Arabia. It was also Europe's single most important energy trade partner, supplying Europe with close to half of its solid fuel imports, over 40 percent of its natural gas imports, and over a quarter of its crude oil imports. In comparison, Norway, the second largest supplier, accounted for a much smaller 16 percent of the natural gas and 7 percent of the crude oil imported by the EU in 2019. Fourteen of the 20 largest country importers of Russian fossil fuels were Member States of the EU—Germany, the Netherlands, Italy, Poland, France, Bulgaria, Belgium, Spain, Greece, Austria, Romania, Slovakia, Hungary, and Estonia—the other six countries being China, Turkey, India, Japan, Egypt, and South Korea (Myllyvirta et al. 2022). While the EU had long indicated its intentions to expand renewables and decrease fossil fuel use over the next decades, it was broadly understood that gas path dependencies would remain for years to come. Natural gas from Russia was viewed as important for Europe's energy transition away from the most polluting fossil fuel—coal—with the assumption being that any phase-out of natural gas would require decades (Muradkhanli 2023).

### *Gas Pipelines Linking Russia to Europe and its Economic Powerhouse, Germany*

In previous decades, an extensive set of pipelines was built to enable the shipment of Russian gas to Eastern Europe, including the *Druzhba* (friendship), and *Soyuz* (union) pipelines, part of the Brotherhood pipeline system. Already during the Cold War, the first efforts to link Russia to Western Europe via trade—exchanging gas for pipeline and drill technology and know-how—began. In the early 1970s, the first pipeline extensions to Western Europe were launched (Bros, Mitrova, and Westphal 2017). In the following years, further gas line projects were initiated, most notably extensions to the Yamal pipelines, which transported gas from the Yamal Peninsula and western Siberia to Western Europe via Belarus, Poland, and Ukraine.

Germany was a major supporter of a concept known as *Ostpolitik*, literally “eastern policy”—the idea that strong economic ties with Russia would strengthen mutual interdependence and enhance the prospects of peaceful coexistence. Chancellor Willy Brandt was credited with launching *Ostpolitik*, a policy that opened the doors for the eventual reunification of Germany under the chancellorship of Helmut Kohl and the later enlargement of the European Union to the East. *Ostpolitik* was thus seen as a logical and legitimate strategy to follow with the Soviet Union and later with post-Soviet Russia that could contribute to a softening of Russian authoritarianism (Kinkartz 2022). By the time the Berlin Wall came down in 1989, Germany was already importing about one-third of its gas demand from the Soviet Union (Sullivan 2022).

As a major manufacturing power and Europe’s largest economy, Germany is power hungry. The end of the Cold War was seen as an opportunity for Germany to gain access to even more cheap Russian gas to power its steel, chemical, glass, and automobile industries as well as to supply its electricity and thermal power plants (Bros, Mitrova, and Westphal 2017). Germany was eager to have pipelines that did not traverse Eastern European states—especially Ukraine and Poland—given the history of tensions between these states and Russia. On a number of occasions, Russia stopped gas flows to Europe via these transit routes in response to conflicts with Ukraine over gas transit fees, raising German concerns about its energy security. This led to decisions by Germany (in cooperation with several other European states) to build new pipelines that would allow the direct import of natural gas from Russia to Germany via the Baltic Sea. Gerhard Schröder of the Social Democratic Party, who served as chancellor from 1998 to 2005, played a particularly prominent role in supporting the Nord Stream pipelines. Angela Merkel of the Christian Democratic Union, who succeeded him as chancellor, lent her support to the Nord Stream projects as well (Muradkhanli 2023). Fourteen years after the project was first started, the two Nord Stream 1 pipelines were inaugurated on November 8, 2011, by German Chancellor Angela Merkel, Russian President Dmitry Medvedev, French Prime Minister François Fillon, and Dutch Prime Minister Mark Rutte. Construction of the Nord Stream 2 pipelines (two additional pipelines) began in 2015 under Chancellor Merkel’s leadership with former Chancellor Schröder’s strong support; they were completed in 2021.

The Baltic states, Poland, Ukraine as well as the United States warned against building the Nord Stream pipelines, which they claimed threatened European energy security by making Europe overly dependent on Russian gas. In a joint statement, Poland and Ukraine criticized Germany: “The decision to build Nord Stream 2 made in 2015 mere months after Russia’s invasion and illegal annexation of Ukrainian territory, created a security, credibility and political crisis in Europe” (Euronews 2021a).

Germany’s energy and security politics began a radical transition on February 22, 2022, hours after Russia recognized the independence of Donetsk and Luhansk oblasts (provinces) of Ukraine. Germany’s new chancellor, Olaf Scholz, who was from the Social Democratic Party, announced he would not provide the certification necessary for the Nordstream 2 pipelines to go into operation. Two days later, on February 24, Putin launched his war on Ukraine, further shaking Germany out of its naivety and leading to a major rethinking in Germany about Russia and Vladimir Putin’s intentions.

### *The EU Moves to End Dependence on Russian Fossil Fuels*

Europe entered the winter of 2021 with sharply rising gas, coal, and electricity prices. This was in large part due to Russia’s decision to restrict shipments just as energy demand was growing again in Europe once COVID-19-related restrictions started being lifted. European Commission President Ursula Von der Leyen stressed the urgency of becoming independent of Russian fossil fuels, stating that Europe cannot rely on a supplier who is threatening the continent. She warned that Europe remains “too reliant on gas,” making it vulnerable to soaring gas prices and possible supply cut-offs. Playing the role of a political entrepreneur, she highlighted the importance of

the European Green Deal's vision of a carbon-neutral, circular economy: "A speedy transition to clean energy would also make the bloc a more independent global player" (Euronews 2021b). Efforts to promote energy efficiency and energy savings, renewable energy expansion, and green hydrogen development were already underway when the war broke out. A window of opportunity to speed up and expand the scope of Europe's green energy transition was thus provided by Putin's aggressive actions.

The European Union began the process of weaning itself off Russian fossil fuels soon after the war began, albeit more slowly than critics of Russian aggression would have liked to see. The very big differences in EU Member States' dependence on Russian fossil fuels complicated efforts to achieve quick action. On March 8, 2022, just weeks after the start of the war, the EU Commission outlined a plan (RePowerEU) to cut Russian gas imports by two-thirds by the end of the year and to end dependence "well before 2030" (Taylor 2022). The RePowerEU plan was formally communicated on May 18, 2022 (European Commission 2022a, 2022b). It proposed ambitious new targets for energy saving and an increase in renewable energy targets in the power, building, and transport sectors. In response to the plan, the Renewable Energy Directive and the Energy Efficiency Directive are being amended, setting higher targets.

Early signs of change are manifold. The industry group, SolarPower Europe, issued a report showing that EU solar power soared by almost 50 percent in 2022, with 41.4 gigawatts (GW) of solar being installed, an increase of 47 percent from the 28.1GW installed in 2021 (SolarPower Europe 2022). The largest capacity increases were in Germany, Spain, Poland, the Netherlands, and France.

Sanction packages became an important vehicle for negotiating agreements among Member States related to their energy policies. In its fifth round of sanctions issued on April 8, 2022, the EU agreed to a ban on imports of all forms of Russian coal effective August 1, 2022. In its sixth round of sanctions (June 3, 2022), the EU issued a complete import ban on Russian seaborne crude oil (to go into effect within six months) and petroleum products (to go into effect within eight months). Combined, these restrictions covered 90 percent of oil imports from Russia. Exceptions were made for Hungary, Bulgaria, and Croatia, given their special energy dependencies. EU operators are now prohibited from insuring and financing the transport of Russian oil to third countries (European Commission 2022c). A tenth sanctions package was released on the one-year anniversary of the start of the war (European Council 2023), and an eleventh package was issued in June 2023. Both aim to make it harder for parties to circumvent the sanctions (European Commission 2023d). Neither China nor India have joined in on these sanctions, frustrating Western powers.

European sanctions on Russian gas, oil shipments, petroleum products (such as diesel and jet fuel), and coal do not look like they will end any time soon. This means that Russia has lost major revenue sources even if, in 2022, Europe was still paying large sums to Russia for the smaller quantities of energy it was importing. Since the war began, gas flows from Russia to Europe have dropped precipitously. Russia also retaliated against the import restrictions placed on it by reducing energy exports to Europe. Russia stopped westward gas flows through the Yamal pipeline soon after the war began. Flows through Nord Stream 1 ended in September 2022, after its two underwater pipelines plus one of the Nord Stream 2 pipelines were blown up in multiple places in still unexplained circumstances. Some gas—less than contracted—does, however, flow through the Ukrainian network (Sudzha being the main route) and the Turk Stream pipeline (via Turkey) (Afanasiev 2023; Elliott 2022). Ukraine has warned Eastern European countries which still rely on these gas imports that it is unlikely to renew the gas transit deal that allows Gazprom to pipe gas from Russia via Ukraine; it is set to expire at the end of 2024 (Gavin 2023). Russia's war on Ukraine is proving to be a powerful accelerator of

Europe's diversification of its fossil energy suppliers and of the transition towards a clean energy future.<sup>3</sup>

### *Germany and the End of Ostpolitik*

Russia's march into Ukraine and weaponization of energy made it painfully clear to German policy leaders how dependent the country still was on fossil fuels and especially on imported Russian gas. For the "traffic light" coalition (the Social Democratic Party—red, the Free Democratic Party—yellow, and the Green Party—green) that had formed only a few months earlier, the war has proven to be both a huge challenge and an opportunity to pursue larger policy changes. The newly reorganized Ministry of Economic Affairs and Climate Action, headed up by Robert Habeck from the Green Party, seized the moment, introducing dozens of new laws and programs aimed at simultaneously ending dependency on Russia while reducing overall dependence on fossil fuels through the promotion of energy savings, energy efficiency, renewable energy expansion, and green hydrogen development.

To understand the direction of the regulatory changes that came in response to the external shock of war, it is helpful to first examine the recent German climate and energy regulatory developments. In 2019, the German government issued its first national climate law (*Bundes Klimaschutzgesetz*), which set a 2050 climate neutrality target for the country. In April 2021, however, the Constitutional Court determined that the law was unconstitutional as it did not adequately protect the basic rights of younger generations because it put too much of the burden of reducing climate emissions to the period after 2030 (Bundesverfassungsgericht 2021). In response to the court ruling, the government amended the climate law, shifting forward its climate neutrality target to 2045 and setting mid-term targets (a 65 percent reduction compared to 1990 GHG levels by 2030 and an 88 percent reduction by 2040). The Climate Action Programme 2030 and the Climate Action Plan 2050 were also adjusted to account for the new targets. These plans set out specific targets for different sectors that needed to be reached on an annual basis through 2030.

Up until early 2022, Germany was by far Europe's biggest importer of Russian gas. In response to the war, in April 2022, the coalition government introduced what came to be known as the "Easter Package"—a set of legislative initiatives aimed to speed up and expand the deployment of renewable energy even more than had been called for in the amended climate law. The package of legislative initiatives, which was passed into law in July 2022, increased the share that renewables are to have in the electricity sector to 80 percent by 2030. Permitting processes for renewables are being simplified, and obligations were established to make the 16 German Länder (states) contribute to achieving a target of setting aside 2 percent of German territory for the development of wind parks. Further measures were introduced to promote the research and development of green hydrogen and electric vehicles. Industries and customers were asked to voluntarily cut back on their electricity and gas use, and government offices were required to do so as well. These efforts, combined with the effects of the sharp rise in gas prices and a relatively mild winter, contributed to a 14 percent reduction in gas demand in 2022 compared with the average for the four years from 2018 to 2021 (Bundesnetzagentur 2023).

However, the crisis had other consequences that did not fit so well with the policy interests of the Traffic Light Coalition. To make up for the loss in Russian gas supply, imports from Norway and the Netherlands had to be expanded. The German government was also forced to enter into new gas and oil contracts with Canada, the United States, and Middle Eastern countries. The

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<sup>3</sup> As a side note of interest, despite some discussions, Europe has not taken steps to end the import of fuel rods from Russia for its nuclear power plants. In the spring of 2023, the French firm Framatome even expressed its interest in producing nuclear fuel in a joint venture with Russia's Rosatom (Jordans 2023).

government also passed legislation permitting the temporary placement of about eight GW of hard coal and lignite plants into a reserve capacity through the end of March 2024 to replace gas plants in electricity production should the country be hit with a gas shortage (Bundesregierung 2022). This reserve capacity came from coal-fired power plants that had been or were soon to be moth-balled under plans to phase out coal-fired power plants by around 2030. A short extension of the operating time of Germany's remaining three nuclear power plants through April 2023 also was approved despite the misgivings of the Green Party. These emergency measures were taken to cover energy supply in a worst-case scenario.

There has been a heavy price to pay for these changes on the part of consumers and government coffers. Gas prices reached record highs in 2022, with the average power price for a German household using 3,500 kWh per year jumping from 32.16 Euro cents/kWh in 2021 to 40.07 cents/kWh in the second half of 2022 (Wehrmann 2023). The added costs for consumers and industry have been substantial, and this has led to growing concerns about public acceptance of specific policy measures. The government has been forced to intervene with price caps and rebates for private and industrial consumers.

Despite these many challenges, by the end of 2022, German imports of Russian fossil fuels had been largely stopped. While Germany was forced to temporarily rely more on heavily polluting coal, Putin's war on Ukraine helped the Traffic Light Coalition speed the shift away from fossil fuels, to enhance energy savings, and to build up renewable energy capacity.

#### *Poland Reacts to Russia's Invasion of Crimea*

Poland and its Baltic neighbours were particularly vocal in their criticism of Russia's illegal war on Ukraine. Poland began to reduce its dependence on Russian energy in response to the Russian invasion of Crimea in 2014; its dependency on Russian gas dropped from around 76 percent in 2014 to 55 percent in 2021. Once the war broke out, Poland pursued energy demand reduction policies, cutting demand by 13 percent. Renewable energy capacities were also increased, bringing the country's total to 21.2 GW (European Commission 2023e). A series of liquefied natural gas (LNG) terminal and gas pipeline projects, which had been initiated in the previous years to enhance the region's energy security, came into operation in 2022, thus blunting the impact of Russia's cut off of gas supplies through the Yamal pipeline in April 2022 after Poland refused to pay for the gas in rubles (Andzāns 2022; Cohen 2022). Moreover, Poland's contract with Russia's Gazprom for gas imports via the pipeline was set to expire at the end of 2022, and the country's leaders had long made it known they had no intention of renewing it (Wanat 2022).

Poland, with large supplies of domestic coal, has been a foot-dragger in relation to European climate policies. It is the only EU Member State not to have set a climate neutrality target for at least 2050. The Russian invasion of Crimea in 2014 did, however, initiate a rethinking of Polish energy policies with a main focus on securing interconnectivity with other European states. Poland was able to maintain a stable supply of energy to its economy in part because it was able to import gas and oil in 2022 through the newly built fossil fuel infrastructure connecting it to its neighbours to the North and West. While the 2022 Russian war against Ukraine has also led to some climate-policy-relevant changes in Poland, the impacts have been less dramatic than in Germany, where climate change has had a higher priority among citizens and policymakers.

#### *France and the Need to Cope with Multiple Crises*

For France, which also had a much lower dependency on Russian fossil fuels than Germany, the war nevertheless has had dramatic impacts that have accelerated its energy transition. France was struck by a series of crises in 2022. Not only did it have to contend with the consequences of Russia's invasion of Ukraine, a record hot summer and drought conditions

lowered the level of French rivers, creating a problem for the country's nuclear power plants, which need water to cool their reactors. In addition, a backlog of maintenance and repair issues meant that in the fall of 2022, just as Europe was entering its first winter without stable supplies of Russian gas, 26 of France's 56 reactors were offline (Alderman 2022). The country thus had to scramble to repair its nuclear plants and import electricity from its neighbours, including Germany. In 2022, France was in the unusual situation of importing more electricity (72.9 TWh) than it exported (56.5 TWh) (Fraunhofer ISE 2023). In reaction to the war and the RePower EU Directive, France passed the Renewable Energy Acceleration Bill. The measures included in the bill aim to speed up permitting processes. France now aims to produce as much electricity from renewables in 2050 as its total electricity demand stood at in 2022. This will mean a ten-fold increase in solar power (100 GW) and 40 GW of offshore wind (Messad 2023). Yet, unlike Germany, which is pursuing a double transition—phasing out nuclear while phasing down fossil fuels—France plans to continue to invest in nuclear plants and sees nuclear energy as an integral part of its energy mix.

### **Linking Ukraine to European Energy Infrastructure**

For Ukraine, maintaining a stable energy supply during the war has been a major challenge. Infrastructural path dependencies from Soviet times have complicated Ukraine's efforts to maintain stable energy supplies while under attack from Russia. In 2021, before the latest Russian incursion into Ukraine, 55 percent of Ukraine's electricity was generated by 15 pressurized water reactors of Russian design operated at four nuclear power plants, including Europe's largest nuclear power plant, Zaporizhzhia. Coal was the second largest source at 23 percent, and renewables accounted for another 14 percent (Statista Research Department 2023). Ukraine has substantial fossil energy reserves and was producing about two-thirds of the energy it consumed. Despite its relatively high level of energy self-sufficiency, Ukrainian energy generation facilities are in precarious conditions.

Electricity generation facilities have been a main target of Russian attacks. The Chernobyl nuclear facility, which is undergoing decommissioning, was occupied and vandalized by invading Russian troops in late February and early March 2022 (Russian troops have since pulled out of the region). The Zaporizhzhia nuclear power plant, now under the control of Russia but with Ukrainian staff still working at the plant, is in an active war zone and has even been hit by missiles, raising global concerns about the potential for another nuclear disaster. Zaporizhzhia's six reactors have been shut down, but there is still the risk of a nuclear catastrophe should they be blown up. The International Atomic Energy Agency has sent experts to monitor the situation, demanding access throughout the facility in light of opposing statements and allegations being made by the Ukrainian and Russian governments regarding the military situation and vulnerabilities at the site, including reports that the site might be mined. There have also been incidents where electric power to the plant has been cut off, forcing the cooling systems to rely on backup power generation (International Atomic Energy Agency 2023). An additional concern relates to the availability of water to cool the six shut-down reactors and spent fuel storage after the destruction of the Kakhovka reservoir. Steps are being taken to assure access to alternative water supplies, but the destruction of the Kakhovka dam illustrates just how vulnerable and tense the military situation around the plant is. Throughout the winter of 2022-2023, blackouts and scheduled curtailments became a new norm for many regions of Ukraine as Russia launched attack after attack on the country's electricity infrastructure, depriving Ukrainians of electricity, heat, and water.

Efforts to decouple Ukraine's energy dependence on Russia and provide alternative energy pathways have been critical components of EU's support for Ukraine. Plans had already been laid out years earlier to connect Ukraine to the European grid as a result of Russia's earlier

invasions. These plans were put in fast-forward after the February 24, 2022 invasion. In the course of just two weeks, Ukraine's electricity grid was synchronized (and thus connected) to the European grid (Blaustein 2022). Ukraine has also been supported in other ways. European countries have assisted with parts to repair damaged generation facilities and have shipped over a thousand portable power generators to support critical facilities (hospitals, schools, etc.). The European Union also launched a program in January 2023 to supply Ukrainians with light-emitting diode (LED) lamps, which use about eight times less electricity than incandescent light bulbs. Thus, even in war-torn Ukraine, efforts are being made to link the war-related energy crisis to climate-friendly solutions (Delegation of the EU to Ukraine 2023).

Once the war ends, Ukraine will need to be supported in its efforts to rebuild. With Ukraine aiming to become a member of the European Union, it will also need to work to meet European climate goals. Renewable energy expansion is already being discussed as an important way of achieving greater energy security and a less intensive carbon footprint (Cahill and Dawes 2023).

### **Canada and the United States Deepen Their Energy Ties to Europe**

The United States is one of the world's largest producers of oil, coal, and gas; it was thus far less dependent on Russia for fossil fuel imports than Europe. While total petroleum imports from Russia in the period from 2000 to 2021 varied, peaking first around 2011 and then again at a slightly higher level in 2021, they amounted to only about 8 percent of all US petroleum imports (including both crude oil imports and petroleum product imports, such as unfinished oils) (Hack 2022). On March 8, 2022, US President Joe Biden announced that the United States would stop importing Russian oil and refined petroleum products.

Canada was never a big importer of Russian fossil fuels, importing less than 1 percent of its crude oil demand in 2019 and none thereafter (Canada Energy Regulator 2022). This made Canadian Prime Minister Justin Trudeau's decision to end Canadian imports of Russian oil relatively straightforward. Canada is becoming an increasingly important partner for Europe as it seeks to decarbonize its economy while ridding itself of Russian fossil fuels (Nunez, Quitzow, and Schreiner 2022).

Both Canada and the United States have entered into new energy trade and cooperation deals with Europe. Shipments of liquefied natural gas to Europe from the United States picked up once the war began (Zachmann, Scaravatti, and McWilliams 2023). Europe became the largest market for US LNG in 2022, accounting for 64 percent of exports (US Energy Information Administration 2023). Canada intends to start shipping green hydrogen produced from wind farms to Germany in 2025 (Platt and Nienaber 2022). In its efforts to diversify suppliers, Europe has also courted Canada in relation to minerals, such as lithium, cobalt, nickel, manganese, and natural graphite, which it needs to produce batteries and renewable energy equipment. The release of the EU's Critical Raw Materials Act in March 2023 was accompanied by EU President Ursula von der Leyen's visit to Canada and the US to tighten and expand transatlantic energy partnerships.

### **China Deepens its Energy Ties to Russia**

China, in contrast with Western nations, has refrained from criticizing Russia for its aggression and has instead placed blame for the war on what it views as the US-led expansion of NATO. Despite some differences between them, China and Russia have a joint interest in limiting US power in the international system. China's tacit acceptance of Russia's "special military operation" in Ukraine could be read as a willingness to accept Russia's view of history and Putin's claims that Ukraine belongs to Russia. Soon after the invasion began, China's President

Xi Jinping spoke of the historically close relations that have formed between Russia and China and placed the blame for the war on the West and US-led NATO expansion (Blanchette 2022).

China has been on a global search for additional energy sources for the past several decades to fuel its economic growth and meet the demands of its large and increasingly middle-class population (Leonard 2022). China became a net importer of oil in 1993 and the world's largest net importer of oil in 2017; it is over 70% dependent on imported oil and over 40% import dependent for its gas (International Energy Agency 2022). For China, Russia is seen as a potential source of cheap oil and gas. Gas began to flow from Russia to China via their first joint pipeline, Power of Siberia, in December 2019. The \$400 billion, 30-year agreement was initiated in 2014 between Russia's Gazprom and the China National Petroleum Corporation; the pipeline has a capacity of 38 billion cubic meters of gas a year (Moscow Times 2019a). China sharply increased energy imports from Russia in 2022 (Tan 2022); its pipeline gas imports increased by 2.6 times and LNG imports by 2.4 times. Crude oil imports also grew by 8 percent (Hale 2023).

On the one-year anniversary of Russia's attack, 141 nations voted to support a UN resolution calling on Russia to immediately and unconditionally withdraw from Ukraine. Yet, in addition to seven countries that voted against the resolution, China, India, Iran, and 29 other countries abstained from the vote, weakening its impact (UN 2023). Much to the frustration of Europe, Canada, and the United States, China has deepened its ties with Russia despite its claims of neutrality vis-à-vis the war. In July 2022, the same time that the West was decoupling from Russian fossil fuel dependency, China and Russia announced plans for a new gas pipeline, The Power of Siberia – 2, which will transit Mongolia and deliver gas from western Siberia to China. Pipeline construction is to begin in 2024, and the pipeline is to go into operation by 2030. The possibility that the timeline will be accelerated in reaction to the war exists (Moscow Times 2022).

The effectiveness of European sanctions has been dampened by Chinese as well as Indian and Turkish purchases of Russian oil and gas. Russia does, however, appear to be earning less for the oil and gas it exports due to the price cap Europe put on Russian oil in its tenth sanction package (Menon 2023). China's unwillingness to openly come out against Russia's invasion of Ukraine and its purchasing of Russian fossil fuels have strained its relations with the West and led European countries to begin to rethink their heavy dependence on China for rare earth minerals and clean energy parts and products.

### **The Climate and Environmental Implications of the Russian War on Ukraine**

Globally, greenhouse gas emissions continue to rise even while climate scientists warn that they need to be cut dramatically in this decade if the global average temperature increase is to remain within the 1.5 degrees Celsius range. There is still much work to be done in relation to funding developing countries to address climate-related loss and damage, to addressing post-2030 national climate ambitions, and to preparing the Global Stocktake (GST) set to take place at the 2023 UN Climate Change Conference (COP28) in December 2023 in the United Arab Emirates (Directorate-General for Climate Action 2022). The next rounds of international climate change negotiations are likely to be especially challenging, given rising nationalism, growing global tensions, and inflationary tendencies linked to the Russian war against Ukraine. The countries that will have some of the most influence on global emission levels—the United States, China, the European Union, and Russia—which together, account for about half of global carbon dioxide emissions, have seen their scientific cooperation negatively impacted by the war, for example, in relation to Arctic and space science—two critical areas for climate change research (Gaid et al. 2022).

### *European Greenhouse Gas Emissions Drop as Renewable Energy Expansion Accelerates*

While the loss of access to Russian gas has pushed some countries to use more coal and oil, which have higher carbon contents, the transition away from fossil fuels in Europe is picking up steam. The Environment Protection Agency in Germany estimates that Germany's greenhouse gas emissions in 2022 dropped by 1.9 percent compared to 2021 levels (Umwelt Bundesamt 2023). Increased use of hard coal and lignite in the energy sector as a short-term response to the loss of Russian supplies was offset by steep increases in renewable energy deployment, which reached 20.4 percent of gross final energy consumption, up from 19.2 percent in 2021 (Umwelt Bundesamt 2023). European Union greenhouse gas emissions were also down in the fourth quarter of 2022 when compared to pre-pandemic levels, suggesting that despite greater use of coal and oil, reductions in energy demand and the expansion of renewable energy capacities were beginning to have an impact (Eurostat 2023b). Especially noteworthy is that EU emissions appear to have dropped by 2.5 percent in 2022 compared to 2021 levels, suggesting that Europe's acceleration of its energy transition has had a positive climate impact (International Energy Agency 2023). Further drops in European greenhouse gas emissions can be expected as the policies introduced in 2022 are beginning to kick in.

### *Global Clean Energy Competition and US Climate Change Policies*

While the war has had limited direct impacts on US climate and energy policies, there have been important indirect impacts. Already in 2021, as one of his first acts as president, Joe Biden returned the United States to the Paris Agreement. His administration subsequently proposed the 2021 Infrastructure and Investment Jobs Act, targeting money for public transportation, renewable energy development, digital infrastructure, grid infrastructure, electric vehicles, and hydrogen fuel technologies, which received bipartisan support in Congress. This was followed by the Inflation Reduction Act, which is said to be the largest climate bill ever passed. The Act allocates USD 370 billion in support of renewables, green technologies, and climate mitigation and aims to shift investments from the private sector towards green technologies (Colón, Christianson, and Childs 2022). The act covers climate and environmental justice block grants, enhanced monitoring of methane and air pollution, the clean-up of transit systems, and the promotion of clean energy, for example, through seeding state and local clean energy financing institutions (White House 2022). The law is already resulting in a visible global competition for clean-tech leadership. China has become dominant in recent years in the clean-tech area. The new laws aim to put the US back on track to becoming a leading manufacturer of clean energy technologies. The EU responded to this new climate legislation with an EU Green Deal Industrial Plan. Canada, which aims at climate neutrality by 2050, is now talking about the need for a clean energy industrial plan (Haley 2023).

### *Environmental Destruction in Ukraine*

The war's impacts on the Ukrainian environment have been enormous. Ukrainian forests have been devastated, wind turbines destroyed, buildings burned, and soils contaminated. One interim assessment puts the greenhouse gas emissions for the first seven months of the war at 100 million tonnes of carbon dioxide equivalent (tCO<sub>2e</sub>), about the level emitted by the Netherlands during the same period (de Klerk et al. 2022). Ukraine pointed out at the 2022 UN Climate Change Conference (COP 27) in Egypt that the war was a major contributor to global greenhouse gas emissions and environmental destruction (Rannard 2022). Beyond environmental and climate change impacts, the effects of Russia's war have been devastating for global food availability. Ukraine is one of the world's top five producers of cereals and grains. The war has caused widespread damage to farms, transport infrastructure, grain storage facilities, and harbours.

### *Uncertainty Regarding Russia's Climate Policies in Lieu of the War*

Climate change has not been high on the Russian political agenda, and many climate skeptics can be found among Russia's political elite. Andrei Semenov, a visiting fellow at the Center for Strategic and International Studies, described the challenge of pursuing climate mitigation in Russia: "President Putin does not consider the climate agenda other than as a threat to Russia's national security and economy, and the subordination of other branches of power to the chief executive precludes other actors from developing their own agenda" (Semenov 2021). Russia is the world's fourth largest greenhouse gas emitter, responsible for approximately 4.7 percent of global emissions and the third largest historical emitter behind the United States and China, responsible for 6.9 percent of the carbon dioxide emitted in the world since the start of the industrial revolution (Evans 2021).

While Putin has a history of denying the seriousness of climate change and the role of anthropogenic emissions in contributing to warming temperatures, the melting of permafrost, desertification, and damage to agriculture as a result of climate change threaten the country. The Russian Environment Ministry released a report indicating that Russia was heating at twice the rate of the rest of the world between 1976 and 2018 (Moscow Times 2019b). Russia signed the Paris Agreement in 2019.

In the summer of 2021, in the lead up to the climate negotiations in Glasgow, Scotland, Putin announced a climate target: to make Russia climate neutral by 2060 and to reduce Russian carbon emissions by 25–30 percent of 1990 levels by 2030 (Oshchepkov 2021). To what extent Russia is serious about its climate targets is an open question. Its targets have been viewed with considerable skepticism in the West. The Carbon Action Tracker (2022) rated Moscow's targets as critically insufficient and summed them up as equating to Russia working towards a 4 degrees Celsius global temperature increase. Troianovski and Ponomarev (2021) suggest the target may have been made out of economic necessity given that the EU was planning to put tariffs on products with a high carbon content, impacting Russian exports. Angelina Davydova (2023), writing for the Carnegie Endowment for International Peace, suggests the decline in Russian GDP and depopulation could reduce Russian greenhouse gas emissions, "but can hardly be seen as genuine decarbonization."

With Russia now viewed as a pariah state in the West, and with a growing number of states scaling back and ending imports of Russian fossil fuels altogether, Russia is unlikely to show any real interest in cooperating with the West on meaningful climate action. In fact, in June 2023, it blocked Europe's efforts to propose an Eastern European country to host the international climate change negotiations in 2024 (Weise 2023). Russia's own emissions could, however, fall as its fossil fuel production volumes drop.

### *Global Greenhouse Gas Emissions*

In its March 2023 global carbon dioxide emissions report, the International Energy Agency found that global growth in emissions was lower than had originally been feared as a result of the global energy crisis created by the war (International Energy Agency 2023). While global emissions did rise, growing by 0.9 percent in 2022, the rise was smaller than it had been in previous years. Increased emissions from coal and oil were offset by reductions in emissions from natural gas and a strong expansion of renewable energy. At the end of 2022, British Petroleum estimated that the push to enhance energy security by promoting domestic renewable energy development could lead to a 3.7 percent drop in global emissions by 2030 and 9.3 percent in 2050 (Lawson 2023).

## **Conclusion: A Crisis with Major Implications for the Geopolitics of Energy and Climate Mitigation**

The Russian attack on Ukraine's territorial sovereignty has had major geopolitical implications. After years of weak Western responses to earlier Russian territorial incursions into neighbouring states, Putin clearly miscalculated when he launched a full-scale attack on Ukraine. Rather than fragmenting and weakening Europe and NATO, his actions have brought the West together. NATO has been strengthened, and its membership expanded. Putin's attempts to blackmail Europe by closing the valves on energy exports failed. Rather than forcing Europe into acquiescence and acceptance of new territorial realities, Putin pushed Europe to fundamentally reconsider its energy security programs and infrastructure and sever many of its most important trade ties with Russia.

Theoretically, it is clear that the global energy crisis triggered by the war has been used by various political entrepreneurs to pursue policy solutions that might otherwise have been difficult to achieve and would certainly not have been otherwise possible in such a short time frame. The war has forced Western policymakers to pay greater attention to how they can strengthen resilience against external shocks by diversifying supplies. It has also given climate legislation a boost, especially in Germany and at the EU level. Skillful policy entrepreneurs successfully coupled concerns about fossil fuel import dependence with the need to make progress on climate mitigation. While some new path dependencies may have been created when imports of fossil fuels from Russia were replaced by fossil energy imports from Norway, the Netherlands, Canada, the United States, and various Middle Eastern countries and Putin's war did cause a short-term spike in coal use in Europe, it has also accelerated green energy revolutions in Europe and the United States with Canada and Europe intensifying climate cooperation. In the months after the war broke out, Europe reduced its energy demand through various energy-saving campaigns, set higher targets for renewable energy capacity development and energy efficiency improvements, and altered rules to speed up permitting processes for the introduction of clean energy technologies.

Significantly, a further spill-over effect of Putin's war may be that it is accelerating competition for clean energy and geopolitical leadership between China and the US, with major implications for Europe and Canada. Learning lessons from its excessive dependence on Russia for fossil fuels, Europe has begun to question if it is too dependent on China as a supplier of the technologies and mineral resources necessary for its own energy transition. This has led Europe to seek new partnerships with Canada and the United States for the minerals needed for batteries, solar photovoltaics, and wind turbines, as well as the development and use of green hydrogen. It has also been a factor, although certainly not the only one, behind some of the new climate legislation introduced in Europe and the United States and being considered in Canada. A major clean energy technology race between some of the world's largest carbon emitters has thus been given an added, if indirect and certainly unintended, boost by Putin's imperial ambitions.

Putin's actions have also led to a European embrace of Ukraine that would have been hardly imaginable at the beginning of the decade. Ukrainian membership in NATO and the European Union no longer seem like a far-off dream. The process of uncoupling Ukraine from Russian energy infrastructure and coupling it to Europe's electricity and gas infrastructure received a major boost from the war. Ukraine's energy supply is now being secured in part via new grid interconnectors to Europe and reverse gas pipeline flows from Europe to Ukraine. Europe is also laying initial plans to aid Ukraine in achieving a post-conflict renewable energy transition and taking a small early step in this direction by supplying the country with millions of LED lights. Thus, contrary to Putin's presumed aims, his war has distanced Europe from Russia, tightened ties between Europe, Canada, and the United States, and connected Ukraine more closely to Europe.

There are, however, still many uncertainties regarding the long-term geopolitical impacts of the war. The Kremlin's failure to diversify the Russian economy means the country is vulnerable. The Kremlin depends very heavily on energy and resource exports to fill its government coffers and on Western countries for advanced technologies (Borrell 2022). This means that the unprecedented scale of the sanction packages Western states have placed on Russia has the potential to cut deeply into the Russian economy and, in this way, cut the funding Putin needs to sustain his military ambitions. While China, India, Turkey, and other states have bought up some of the supplies Europe now rejects, it could be difficult for Russia to fill the gap the sanctions have left. Not only has Russia lost a major export market, it has lost access to major potential sources of investment that it needs to maintain and develop its energy infrastructure and other business sectors. Whether this will lead Russia to capitulate or force it to make major concessions at the negotiating table remains uncertain. Russia could also simply ride out these troubling times and fight a war of attrition in Ukraine. Currently, the West's resolve to continue its support of Ukraine appears strong, and Russia appears increasingly isolated.

What is clear is that Russia's actions are redrawing strategic alliances and speeding up the transition to a low-carbon energy future, especially in Europe but also in other world regions. Military, energy, and climate security have become increasingly intertwined, giving policy and political entrepreneurs the chance to take major steps towards reducing fossil fuel dependency and moving forward on climate change, steps that climate activists have long demanded.

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