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Out of the Frying Pan, into the Fire

The Green Energy Transition, Resource Independence, and the War in Ukraine

Aurélien Pradier & John M. Luiz

Key Points

- We ask how the war in Ukraine is likely to affect the green energy transition and its changing resource requirements in the longer term, given the resource endowments of Russia and Ukraine.
- We argue that the invasion of Ukraine complicates Europe’s green energy transition in the short term and may result in a new form of dependency on Russia, if Russia annexes Ukraine or installs a sympathetic government.
- The worldwide transition to green energy will disturb existing power relations and geopolitical equilibria and may be associated with rising geopolitical tensions with this war being a potential forebearer of what lies ahead.

Introduction

The strategic importance of Ukraine’s natural resource wealth, particularly as it relates to Europe’s energy- and resource-independence in coming decades, is being overlooked both as a factor contributing to the war in Ukraine and in terms of its long-term implications. Scholarly and media attention has overwhelmingly focused on the long-term strategic implications of the end of fossil fuels, but largely overlooked the geopolitical and security implications of the green energy transition and related material requirements (Scholten, 2018) and existing
scholarship on the topic tends to skip over Eurasia (Koch & Tynkkynen, 2021). In all likelihood, the transition will have major geopolitical implications and ‘create a range of new challenges for interstate energy relations’ (Scholten, 2018, p. 2). Ukraine has substantial reserves in most of the rare resources that will be needed for the green transition and is a key component of the EU green transition strategy. As a consequence, an EU–Ukraine strategic partnership for raw materials was launched in July 2021 (European Commission, 2021; Kinch, 2021). For Russia, the EU’s plan to move away from fossil fuels constitutes a major threat to its economic and geopolitical interest in the long term. Not only will the green transition reduce Europe’s dependence on Russian energy imports, which has historically given Russia significant political leverage, but it will also result in the drying up of fossil fuel revenues that keep the Russian economy and political system afloat (Helm, 2018; Henderson & Mitrova, 2020; Van de Graaf, 2018). In his book *Burn out: The Endgame for Fossil Fuels* Helm (2018) predicted:

[Russia] may well turn to nationalism and use ‘external enemies’ to bolster … domestic support in the face of new and much more difficult economic circumstances. The decline of oil revenues will not just be a threat to the internal stability of Russia, but it is likely to be a serious external threat too, exacerbating already difficult situations in Eastern Europe, the Caspian Basin, and further south into Syria and the Middle East. Indeed it already is, as the people of Syria and the remaining bulk of Ukraine have discovered (pp. 126–7).

The invasion of Ukraine complicates the EU’s green transition in the short term and may result in a new form of dependency on Russia, if Russia annexes Ukraine or installs a sympathetic government. Thus, the strategic interests involved in the current conflict are not only military but also economic, as we explore here.
The War in Ukraine

Various reasons have been put forward to explain Russia’s invasion of Ukraine. Putin (cited in Reuters, 2018) views the collapse of the Soviet Union as ‘the greatest geopolitical catastrophe of the century’ and has said that he would reverse it if he could. The tragedy was the dispersal of ‘25 million ethnic Russians who found themselves living outside the Russian Federation’ across USSR successor states (cited in Barber & Foy, 2019). Ukraine is not only home to a significant number of ethnic Russians but also the historical cradle of the Russian nation itself, which is why many Russians, including Putin, view Ukraine as an integral part of Russia despite its formal independence since 1991 (Helm, 2018; Rachman, 2021; The Economist, 2021). The Rus people are considered to have originated in Kyiv, which ‘took on an almost mythical part of the narrative of the Russian peoples’ (Helm, 2018) and has ‘anchored Russia’s identity for centuries’ (The Economist, 2021). In July 2021, Putin published a 5,000-word essay ‘On the historical unity of Russians and Ukrainians’ (Putin, 2021), threatening that the ‘true sovereignty of Ukraine is possible only in partnership with Russia’ (p. 14). In his address announcing the beginning of the ‘special military operation’ in Ukraine, he explained that Russia’s aim is not to occupy but to ‘demilitarize’ and ‘denazify’ Ukraine, to protect ethnic Russians against the Ukrainian authorities that he claims are perpetrating a genocide against them (Troianovski, 2022).

Moreover, the Russian government argues that Ukraine’s ‘extremist’ military and government, as well as its constitutionally enshrined aspiration to join NATO, are threatening Russia militarily (Troianovski, 2022). Putin rejects the argument that NATO is a purely defensive alliance, evoking the 1999 NATO intervention in former Yugoslavia (Kuchins, 2016; Troianovski, 2022). His argument is that NATO should have disbanded when the Warsaw Pact did and its continuation and expansion represent not only a security threat but also a betrayal:

The Russian narrative starts with their belief that in negotiating the reunification of Germany in 1990, Gorbachev was assured by the Bush I administration that NATO would not expand its military infrastructure east into former Warsaw Pact states, let alone former Soviet republics, as the Soviet Union still existed at that time (Kuchins, 2016, p. 177).
Western governments retort that no formal agreement limiting the expansion of NATO was ever reached and that Putin is motivated by imperialist ambitions and an unwillingness to let states formerly in the Russian sphere of influence turn westwards (Helm, 2018; Rachman, 2021). Putin, it is argued, is resisting the Russian geopolitical decline and pushing back against the expansion of Western liberalism and democracy, which he fears may spill over to Russia (Barber & Foy, 2019; Helm, 2018). Barber and Foy (2019) explain:

Having witnessed first hand the collapse of communism in eastern Europe and the fall of the Soviet Union, he has long harboured suspicions of western conspiracies to undermine his regime. The colour revolutions in Georgia and Ukraine, as well as the US-led interventions in Iraq and Libya, have further convinced him of malign intentions.

We mention these narratives on the causes of the war only because they form the backdrop to our study, which is limited to understanding how the green energy transition and its changing resource requirements are likely to be affected by this conflict in the longer term. We argue that this is being partly overlooked in the current discourses highlighted in this section.

**Energy Politics**

Russia is one of the largest energy producers in the world, accounting for 10% of the world’s total energy production, ranking first for gas exports, second for oil exports, and third for coal exports (Henderson & Mitrova, 2020). The EU has historically been the biggest buyer of Russian energy and is heavily dependent on imports: Russia supplies 30% of the crude oil and 40% of the natural gas that the EU uses (Hodgson, 2022; International Energy Agency, 2021; Thomas & Race, 2022). The level of dependence is not equally spread across the EU. Germany, for example, meets 64% of its energy needs with imports, and sources 34% of all imported gas and 65% of imported oil from Russia (Nugent, 2022). In May 2022 the EU proposed banning crude oil imports from Russia by the end of this year (with some exceptions for those countries, such as Hungary, that would face the greatest difficulties with such a ban), on top of the ban on the importation of coal which was imposed in April. The EU was also looking at how to phase out Russian gas, but this has greater challenges associated with it given the nature of gas pipelines connecting Russia to Europe.
From the Russian perspective, Europe’s dependency on Russian imports has been a major economic and geopolitical strategic advantage. Russia has exploited its energy dominance in the past to advance its interests and is wielding the threat of cutting gas supplies in the ongoing conflict too (Sengupta, 2022; Thomas & Race, 2022). The ‘Energy Strategy of the Russian Federation to 2030’ explicitly states that ‘energy exports should help to promote the country’s external policy’ (p. 95) and Russia is frequently accused of exploiting and abusing its position as an energy supplier, particularly in its relationship with Europe (cited in Henderson & Mitrova, 2020). For example, after the adoption of pro-Western policies by the Ukrainian government, Russia cut the gas supply to Ukraine in 2006 and again in 2009, thereby also cutting off supplies to other European countries supplied via Ukraine and causing significant economic damage (Hafner & Tagliapietra, 2020; Harned, 2021; Sivaram & Saha, 2018; Smith-Stegen, 2018). Following this, pro-Russian Victor Yanukovych was elected president and ‘Russia clawed back an element of influence over Ukraine’s politics’ (Helm, 2018, p. 137). He was overthrown by the Maidan revolution in 2014, following a sudden decision to reject a political association and free trade agreement with the EU in 2013 (Diuk, 2014). Buoyed by high commodity prices, Moscow resorted to force, annexing Crimea, and beginning to orchestrate political instability in the Donbas region (Diuk, 2014; Helm, 2018). As a result of high energy prices (with oil prices above $100 per barrel), Russia could absorb the cost of Western economic sanctions in the short term (Helm, 2018). Despite condemning the annexation of Crimea, Europe’s dependence on Russian energy actually continued growing after 2014 (Oestergaard, 2022; Petkova, 2022).

Not only does this dependence limit the ability of dependent countries to impose sanctions on suppliers, but revenue flows help kleptocratic, authoritarian regimes emerge or remain in power (Gillies, 2022; Hirsch, Coi & Randerson, 2022; Luiz, 2019; Luiz, Ganson & Wennmann, 2019; Savoia & Sen, 2021). Russia’s fiscal rules ensure that a substantial proportion of these energy-related economic rents flow into the national sovereign wealth fund, thus undermining the impact of economic sanctions against Russia (Hirsch, Coi & Randerson, 2022). Foreign exchange reserves held by the Russian monetary authorities as at February 2022 amounted to roughly $650 billion which placed it in fourth position internationally in terms of the largest holdings of such reserves (The
Economist, 2022). Depending on commodity prices, EU members pay between $500 million and $1 billion per day for Russian oil, gas, and coal imports (International Energy Agency, 2022; Rauhala, Noack & Guinan-Bank, 2022). According to the EU Foreign Affairs and Security Policy representative Borrell (cited in Boffey & Rankin, 2022) the amount paid by the EU for energy imports from Russia is roughly equivalent to the amount of Russian central bank assets that have been sanctioned and frozen. Several high-ranking European officials have argued that Europe should stop energy imports from Russia to avoid paying for the Russian aggression and whilst there have been some developments in this regard, as we outlined above, a full ban remains off the table for now. In a recent television interview, former Foreign Affairs Minister of France, Bernard Kouchner, said that by not turning away from Russian imports early enough ‘we bought the war’ (OEED, 2022). Similarly, Polish Prime Minister Morawiecki explained that ‘President Putin is taking the money from us, from the Europeans and he is turning this into aggression, invasion’ (Hirsch, Coi & Randerson, 2022).

The flipside of Russia’s energy dominance is that it has itself become heavily reliant on the revenue derived from its energy exports. Energy exports account for 60% of all Russian exports (Braun, 2022) and taxes and export tariffs on oil and gas export contributed 45% of Russia’s federal budget in 2022 (International Energy Agency, 2022). This reliance on exports, and on the EU as their main importer, makes Russia vulnerable to sanctions. Given the level of interdependence, an interruption of energy trade between Europe and Russia would be costly for both parties and it is unclear which would be more resilient. However, while Europe failed to reduce its dependency on Russia following the annexation of Crimea in 2014, Russia adapted to Western sanctions by diversifying and turning towards the Chinese market, signing several major energy supply agreements (Helm, 2018). Martus and Rimmer (2022) note that:

[w]hile Europe remains the largest export market for gas, Russia wants to diversify … by increasing supplies to China. In 2019, the Power of Siberia pipeline began transporting gas from Siberia directly to China. Only weeks before the invasion of Ukraine, Russia announced a deal for a new pipeline to China.

By turning to China and other emerging markets (most recently India), Russia is reducing its dependence on Europe and lessening its vulnerability to sanctions through diversification. What remains however is Russia’s dependence on fossil
fuel exports more generally and vulnerability to price-shocks and decreasing demand for fossil energies as the green transition progresses. The IEA (2021) estimates that ‘between 2020 and 2050, demand for coal falls by 90%, oil by 75%, and natural gas by 55%’ (p. 101) to meet the Net Zero emissions target by 2050. As demand for fossil energies contracts, prices will drop, threatening the country’s economic and political model based on energy exports. The EU’s plans to move away from fossil fuels threatens Russia’s economic and geopolitical interest in the long term. Henderson and Mitrova (2020) sketch out the possible implications of the green transition on Russia as follows:

Lower hydrocarbon rents [mean] lower budget revenues and slower economic growth, with implications for government spending and the wealth of the Russian population at large. This could have implications abroad, if reduced military spending limits Russia’s hard power, and at home, if the political regime is undermined by its ability to satisfy the welfare demands of its population … The combination of all these factors could weaken Russia’s global negotiating position, which could be further undermined by the increased use of renewables in countries where Russia has previously exercised leverage through energy exports. For example, Russia’s position in Southern and Eastern Europe is likely to be weakened as those countries become less reliant on imported energy and are able to diversify away from Russian oil, gas and coal. Equally, countries in North East Asia, where Russia is hoping to gain an increasing foothold, thanks to oil and gas exports, could also become less engaged with the Kremlin as their energy needs increasingly focus on alternative sources with lower carbon intensity (p. 109).

Cohen (2019) warns that ‘it [Russia], and other hydrocarbon revenue dependent nations, must accept their new reality, and react decisively, if they hope to survive in the age of renewables’. Low energy prices catalysed the collapse of the Soviet Union and contributed to Russia’s severe financial crisis in the 1990s (Helm, 2018). Today, Russia is more dependent on oil and gas exports than the Soviet Union was (Helm, 2018). In its ‘Strategy of Economic Security until 2030’ the Russian government explicates among the threats to economic security ‘changes in the structure of global demand and consumption of energy resources, the development of energy-saving technologies and reduction of material intensity, the development of “green technologies”’ (cited in Makarov, 2020, p. 131).
Calls to Accelerate the Green Transition

The invasion of Ukraine has highlighted the importance of energy politics in international relations and resulted in calls to accelerate the green transition (Braun, 2022; European Commission, 2022; European Council, 2022; Hodgson, 2022; Hook & Hume, 2022; Martus & Rimmer, 2022; Sengupta, 2022). Prior to the Russia–Ukraine war, arguments for the green transition were usually predicated on the need to limit human environmental impacts and curb climate change. Ever since, calls for a rapid green transition are increasingly based on geopolitical and international security considerations. The EU is now revising its green transition objectives and is planning to accelerate the transition for geopolitical security reasons. At the Versailles Summit, European leaders agreed to completely phase out Russian fossil fuels and reduce energy dependence by speeding up the development of renewables (European Council, 2022). The European Commission President Ursula van der Leyen argued:

We must become independent from Russian oil, coal and gas. We simply cannot rely on a supplier who explicitly threatens us. We need to act now to mitigate the impact of rising energy prices, diversify our gas supply for next winter and accelerate the clean energy transition. The quicker we switch to renewables and hydrogen, combined with more energy efficiency, the quicker we will be truly independent and master our energy system (European Commission, 2022).

What the current crisis highlights is that ‘dependence on fossil fuels is economically damaging and adds to insecurity’ (Ward cited in Hodgson, 2022). In Germany, the country most heavily dependent on Russian imports, officials are now referring to renewables as ‘freedom energies’ (Braun, 2022; Hook & Hume, 2022). While the green transition is undeniably important for environmental reasons and will also have geopolitical advantages, it may give rise to new types of resource dependency. Indeed, renewable energies rely heavily on minerals and metals, the overwhelming majority of which Europe is importing (Simon, 2021; WITS, 2019).

Green transition resource requirements
While shifting the global energy market away from the use of fossil fuels, carbon-neutral technologies require significant mineral and metal inputs, thereby increasing the need for mining. Bauxite and aluminium, lithium, nickel, lead,
chromium, manganese, cobalt, and copper—to name but a few—are all required for renewable energy harvesting and storage technologies. The rapid growth of the global battery market is having corresponding effects on the global demand for minerals and metals required for their production. Currently, lithium-ion batteries dominate the global battery market, driving up demand for lithium but also other minerals like cobalt and manganese which are also essential components of these batteries (Church & Crawford, 2020). Castelvecchi (2021) breaks down the ingredients of a typical electric vehicle battery:

Amounts vary depending on the battery type and model of vehicle, but a single car lithium-ion battery pack ... contain[s] around 8 kg of lithium, 35 kg of nickel, 20 kg of manganese and 14 kg of cobalt (p. 337).

Thus, while the green transition will reduce consumption of fossil fuels, demand for other resources will spike. According to a recent estimate, between 1.9 and 3.5 billion tons of minerals and metals will be required for the green transition through to 2050, to meet the objective of keeping climate change below 2° celsius (Hund et al., 2020). Green energy generation and storage technologies are predicted to increase global demand for lithium by 965% by 2050, compared to 2017 production levels (World Bank, 2019). Global demand for cobalt, graphite, and indium are expected to rise by 585%, 383%, and 241% respectively (World Bank, 2019).

At least one new lithium mine will need to begin operations each year to meet the rapidly increasing global demand for lithium (Church & Crawford, 2020). However, a study of 271 copper deposits found that ‘depending on the location, the average lead-time between discovery and development is 13 to 23 years’ and concludes that ‘the mining industry is not in a strong position to quickly find and bring on stream new capacity to meet a shortfall in production’ (Ali et al., 2017, p. 368). Similarly, Church & Crawford (2020, p. 283) note that ‘the rate of change in the transition to a low-carbon economy has so far been too rapid for the exploration industry to keep pace’.

**Raw material politics**

To meet its raw material requirements for the green transition, the EU is currently heavily dependent on imports (Simon, 2021; WITS, 2019). For some resources, the EU relies almost entirely on a single supplier: 98% of the EU’s
rare earth elements—necessary for the production of car batteries, wind turbines, solar panels, smartphones—are imported from China (Simon, 2021). The green transition, therefore, raises the risk of a new form of energy dependency: ‘Europe’s transition to climate neutrality could replace today’s reliance on fossil fuels with one on raw materials, many of which we source from abroad and for which global competition is becoming more fierce’ (European Commission, 2020, p. 1). Scholten (2018) argues that ‘fossil fuels have shaped contemporary energy-related patterns of cooperation and conflict among countries [and] the transition towards renewables will reshape strategic realities and policy considerations’ (p. 1). To address the risks of new forms of dependency, many countries and also the EU have developed critical materials strategies (Criekemans, 2018). Ukraine is a key competent of the EU strategy. In its report on ‘Critical Raw Material Resilience’ the European Commission (2020) writes:

The EU will need to engage in strategic partnerships with resource-rich third countries, making use of all external policy instruments and respecting its international obligations. There is large untapped potential for building sustainable and responsible strategic partnerships with resource-rich countries. These range from highly developed mining countries like Canada and Australia, several developing countries in Africa and Latin America and countries close to the EU like Norway [and] Ukraine (p. 15).

Ukrainian Natural Resource Wealth

Ukraine has substantial reserves of natural resources including fossil fuels like coal, gas, and oil but its main assets are the significant reserves of raw materials critical for the green transition such as lithium, nickel, cobalt, and graphite (Ukrainian Geological Survey et al., 2020). Zeilina (2022) puts Ukraine’s resource wealth into perspective:

Ukraine has energy resources, as well as both metal and non-metal ores. While Ukraine accounts for only 0.4% of the Earth’s land surface and 0.8% of the world’s population, it has approximately 5% of the world’s mineral resources.

While the green transition threatens the Russian economic model and geopolitical position, the related material requirements present Ukraine with an opportunity for economic development and geopolitical importance. Indeed,
before the Russian invasion, Ukraine was positioning itself as a key player in the clean energy transition and its lithium reserves in particular drew global attention (Tabuchi, 2022). According to a recent assessment, Ukraine has 500,000 tons of untapped lithium oxide reserves, with large accumulations in the contested Donbas region (Rudko, Lytvyniuk, & Karly, 2021; Naumenko & Vasylenk, 2022). This makes Ukraine’s lithium reserves the largest in Europe and among the largest in the world (Tabuchi, 2022; Ukrainian Geological Survey et al., 2020). These reserves are sufficient to entirely meet the lithium needs of all of Europe for the foreseeable future (Rudko, Lytvyniuk, & Karly, 2021; Naumenko & Vasylenk, 2022). While lithium is the most coveted resource for the green transition, Ukraine also has vast reserves of other critical raw materials. It harbours 20% of the world’s total graphite reserves, second only to China which has 26% (Owuor, 2019). Out of the 30 resources on the European Commission’s ‘Critical Raw Materials’ list, Ukraine can provide 21 (Blengini et al., 2020; Simon, 2021).

**EU–Ukraine strategic partnership**

Recognising the strategic importance of energy- and resource-independence, the European Commission published an ‘Action Plan on Critical Raw Materials’ outlining pathways to reduce dependency on resource imports to ‘foster our transition towards a green and digital economy, and at the same time, bolster Europe’s resilience and open strategic autonomy in key technologies needed for such transition’ (European Commission, 2020). Considering Ukraine’s resource wealth, geographic proximity to the EU and ambition to eventually become a member state, an EU–Ukraine strategic partnership was launched in July 2021 (European Commission, 2021; Kinch, 2021). The partnership was intended as a first step towards the development of an integrated value chain of extraction and refining and a significant contributor to the key objectives of the ‘Action Plan on Critical Raw Materials’ (European Commission, 2021; Simon, 2021). Russia’s invasion of Ukraine, therefore, not only highlights the EU’s dependence on Russian energy imports but also compromises EU plans to go green. While the conflict has resulted in calls for an accelerated transition to renewables, the fact is that Europe’s natural resource-dependence and the central role of Ukraine in the transition plans is often overlooked.
Russian Economic/geopolitical Interests

From the Russian perspective, as for other economies largely based on the export of fossil fuels, delays to the green transition and continued reliance on fossil fuels are welcome. Not only will the transition reduce Europe’s dependence on Russian energy imports, which has historically given Russia significant political leverage, but it will also result in the drying up of fossil fuel revenues that keep the Russian economy and political system afloat (Helm, 2018; Henderson & Mitrova, 2020; Van de Graaf, 2018). Helm (2018) predicted that Putin may turn to external enemies, nationalism, and patriotism to bolster domestic support as the economy stumbles:

External ‘enemies’, nationalism and patriotism are what saved Stalin in the 1930s after the damage wrought on the economy by his brutal dictatorship … Putin has lots of ‘enemies’ to focus on, and a sense of national grievance and humiliation to ground his nationalism … For Putin, the possibilities are endless: the rest of Ukraine, Estonia, Latvia and even Lithuania, neutralizing Poland’s Western orientation, Chechnya, Kazakhstan, Georgia and Azerbaijan are all areas which were at one time or another under the control of Russia and then the Soviet Union. If the Russian economy sinks back slowly, there will be a tension between the need for external enemies to play out the Russian nationalism theme and the lack of money to pay for further adventures (p. 142).

If Russia subdues Ukraine and gains control over its territory—through annexation or imposition of a Russia-friendly government—it will also gain control over major reserves of critical raw materials. The invasion of Ukraine complicates the EU’s green transition in the short term and may result in a new form of dependency on Russia, if Russia were to gain some form of control over Ukraine. Schoonover (cited in Tabuchi, 2022), former director of environment and natural resources at the US National Intelligence Council, said ‘It may not be the motivation for the invasion, but there’s a reason why Ukraine is so important to Russia, and that’s its mineral base’.
Conclusion

The war in Ukraine is a devastating humanitarian crisis with complex causes and consequences which we do not seek to underplay, but we highlight a factor that is being overlooked and which has long-term strategic implications. For Europe there is a danger of the proverbial ‘out of the frying pan, into the fire’ as it seeks to expedite the green energy transition, partly to reduce its exposure to Russia and its dependence on critical fossil fuels. In the process it may increase its exposure to Russia or its proxies (if Russia were to gain some form of control over Ukraine) via dependence on other critical minerals and resources required for green energy. There is a danger that the green transition will not guarantee resource-independence but will produce new dependency relations structured around a different set of resources. More broadly, the worldwide transition to green energy technologies will disturb existing power relations and geopolitical equilibria. The period of transition and disruption will likely be associated with rising geopolitical tensions, with the war in the Ukraine being a potential forebears of what lies in store.

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