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Geopolitics of the energy transition:

Energy security, new dependencies and critical raw materials.

Old wine in new bottles for the EU?

Álvaro Rangel Hernández

About the author:

Álvaro Rangel studied Law at the *Jaume I* University (UJI) of Castellón, Spain. He specialised in International Relations at *Universitat Oberta de Catalunya* (UOC) and obtained a Master of Arts in European Political and Governance Studies at the College of Europe of Bruges with a scholarship from the Valencian Regional Government. He holds the title of lawyer and has worked since 2020 in the European Commission.

This paper is based on the author's master's thesis at the College of Europe under the supervision of Professor Wolfgang Wessels.

Contact details:

alvaro.rangel@coleurope.eu

Abstract

This paper examines the process of the European Union's energy transition. Although the energy transition would bring winners and losers, it also would contribute to a more balanced and less conflictual geopolitical map. The EU is in a favourable position to benefit from this process, reducing its dependency on external supply and enhancing its energy security, with the inherent geopolitical dividends this would bring. Such benefits would be conditional on further progress in key areas, in line with the goals of the Paris Agreement and the European Green Deal.

1. Introduction

Humankind has experienced several energy transitions. If our society switched from the use of muscle force, woods and crops, to then coal in the industrial revolution and petroleum resources in the twentieth century, all was driven by the capacity of these energy sources to carry out a task – be it transporting food and water, building a pyramid, or taking-off a plane.

The energy transition taking place currently, however, is not driven by the same purposes: according to the United Nations Intergovernmental Panel on Climate Change (IPCC), if the global temperature rises over 2ºC by the end of the century, natural disasters threaten to devastate countries and make the planet more hostile to life.[1] Against this background, more than 190 nations committed under the Paris Agreement to keep the increase of global average temperature to 'well below 2 °C above pre-industrial levels by the second half of the century, pursuing efforts to limit the increase to 1.5 °C.' This requires, in practice, an 80% reduction of greenhouse gas emissions by 2030 and 100% by 2050, compared to 1990 levels.[2] And much of this will come from phasing out fossil fuels in favour of energy savings and renewables.[3]

To the extent that sufficient and secure access to energy is a precondition to prosperity and a significant driver of international relations, this is a process that will have geopolitical upheavals. Which are the consequences for those who heavily rely on the rents of energy? What do renewables imply from the perspective of geopolitics? It is often argued that

[1] United Nations Intergovernmental Panel on Climate Change (IPCC), 'Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty', World Meteorological Organization, Geneva, link here.
[2] Paris Agreement, article 2 (a), 2015, link here.
[3] Renewables and energy efficiency would represent up to 70% of greenhouse gas emissions reductions by 2050. These gas emissions refer to, mainly, carbon dioxide (CO2) – thus the term 'decarbonisation' – but also methane (CH4), and nitrous oxide (N2O). See International Energy Agency (IEA), 'World Energy Outlook 2019', 2019, p. 79.

competition over raw materials will replace old energy disputes for oil and gas. In other words: is the energy transition old wine in new bottles?

This paper aims to contribute to this debate from the perspective of the European Union (EU). It follows the hypothesis that the energy transition will, indeed, bring winners and losers, but also a more balanced and less conflictual model of international politics. There will be new forms of dependency and energy security issues over renewables, but they would be moderate in comparison to fossil fuels. The extent to which the EU can benefit from this process is, however, conditional on further progress in key areas such as diversification and the capacity to produce, innovate, and create value chains within the EU borders.

The first section sets the theoretical framework based on geopolitics and power. The second section looks into the main implications of the energy transition from the perspective of geopolitics. The third section delves into the specific case of geopolitics and critical raw materials. The fourth section applies the analytical framework to the case of the energy transition and the EU – namely, the geopolitical implications of a decarbonised Europe, its preparedness against the challenges of the energy transition, and – specifically – whether dependencies over Chinese raw materials will end up simply replacing dependencies over Russian gas. The fifth section provides the conclusions.

This paper aims to contribute to the literature of energy geopolitics and the public debate on the energy transition, while bringing more attention to the case of the EU in a moment where energy dependence, security and geopolitics are perhaps more important than ever in the European continent, due to the Russian invasion of Ukraine and the heavy reliance of the EU on the energy resources of Russia. Its findings and conclusions, however, should be regarded from the perspective of investigating an ongoing process, taking place at a global scale and subject to constant developments and innovation. Yet, its arguments and findings may still be useful insofar as they provide an overview of the current thinking on the challenges and opportunities of the energy transition, and the specific case of the EU.

2. Theoretical framework

Geopolitics is perhaps one of the most used, yet less understood concepts. It is thus useful to clarify its meaning and main variables before applying it to the case of the energy transition – and why we argue that phasing out fossil fuels in favour of renewables imply significant changes from a geopolitics perspective.

Geopolitics is, first and foremost, a political science theory. It is also a term widely used by the media, politicians, and commentators to describe power dynamics between nations.[4] The first notions of geopolitics define it as the fight of nations for territory and natural resources, for prosperity and survival, 'quite similarly to evolutionary struggles.'[5] Later in the twentieth century and during the Cold War, less emphasis would be put on geographic determinism in favour of the strategic value of geographical spots and natural resources, and immaterial variables such as the economy, diplomacy, culture or the strength of narratives more lately.[6]

Energy, for its part, is at the core of geopolitics to the extent that it comes from natural resources, and is a precondition for prosperity and human welfare. The vast revenues it creates can enhance other variables of power, such as economic and military strength.[7] In 'energy geopolitics', most attention has gone to (1) petroleum resources and the concepts of (2) 'energy security' and (3) 'dependency'.

(1) Crude oil is the world's most traded commodity and accounts for a market size of around USD 3 trillion, while natural gas ultimately determines electricity – and, thus,

[4] Power, as the ability of states to get others to do what otherwise they would not do, be it through coercive means such as military force or payment – 'hard' power – or without coercion, by means of, for instance, diplomacy, culture, and values – 'soft' power. See Joseph S. Nye, 'Soft Power: The Means to Success in World Politics', Public Affairs, New York, 2004.
[5] Merje Kuus, 'Critical geopolitics', Oxford Research Encyclopaedia of International Studies, 2010, p. 3.
[6] Gearóid Ó Tuathail, Simon Dalby, Paul Routledge, 'The Geopolitics Reader', Routledge, New York, 1998, pp. 7 and 110, link here.
[7] Andreas Goldthau, Caroline Kuzemko, and Michael F. Keating, 'The global energy challenge: Environment, development and security', Palgrave, 2015, pp. 35-42

energy – prices in many countries.[8] That is, they combine a strategic and economic value that affects the world's economy and security like no other commodity.

(2) 'Energy security´ is somewhat more abstract to define: its meaning differs depending on institutional and national perspectives. It´s usually identified with the term ´security of supply.´ We adhere to the terms of the International Energy Agency (IEA) and define it as 'the uninterrupted availability of energy sources at an affordable price.'[9]

(3) 'Dependency' in energy geopolitics derives from an uneven global distribution of petroleum resources. Whereas importing countries depend on third countries and bear the political and financial burden of doing so, exporting countries try to maximise the revenues of the energy they produce. The degree of dependence becomes a security issue when it exposes the importer or exporter to supply or demand 'shocks' i.e. 'security of supply' but also 'security of demand'.[10]

We will define geopolitics as a synonym of power and the will of nations to use it to pursue national and foreign policy goals, which can be done by 'hard' and 'soft' means: be it the use of force and equivalent coercive actions, including the weaponisation of dependencies, but also the use of diplomacy, norms and principles, or the strength of the narratives to pursue the same purposes.

In recent years, there has been a growing interest in the interaction between renewable energy and geopolitics, as more and more countries commit to decarbonising their economies.

[8] Indra Overland; 'Future Petroleum Geopolitics: Consequences of Climate Policy and Unconventional Oil and Gas', Handbook of Clean Energy Systems, 2015, link here.
[9] International Energy Agency (IEA), 'Energy Security', December 2019, retrieved 27/01/2022, link here.
[10] Tadas Jakstas, 'Chapter 5 - What does energy security mean?', in Manuela Tvaronavičienė, Beata Ślusarczyk, 'Energy Transformation Towards Sustainability', Elsevier, 2019, pp. 99-112, link here.

We view energy transition both as a 'process' and as an 'end', i.e., achieving a certain critical degree of fossil fuel substitution, and the process to get there.[11]

Applied to the case of the energy transition, geopolitics – specifically, energy geopolitics – might well predict the dynamics with which this process will evolve, and the effects of it.

3. Reconciling the energy transition with geopolitics

Numerous have attempted to assess the preparedness of countries for the energy transition and come to relatively similar conclusions: most EU and European countries, including the United Kingdom, Norway, Iceland, and Switzerland, but also New Zealand, Singapore, and Japan would be the ´winners´ of the transition, while those countries heavily dependent on the rents of energy would lose. This is the case of Russia, Venezuela, Nigeria, Uzbekistan, Kazakhstan, Chad, Turkmenistan, Azerbaijan, Angola, Congo, and most Middle East and North Africa countries.[12]

This can be explained by: high dependence on the rents of the energy sector, as opposed to dependence on energy imports; renewable energy resources and capacity to develop them, or lack of thereof; the degree of reliance on coal domestically, in terms of energy supply and jobs; economic diversification; governance, regulatory framework and institutionalisation; and, in general, any social and economic condition driving or pulling the change towards phasing-out fossil fuels in favour of energy savings and renewables.[13]

While ceasing to depend on others for energy matters would be excellent news for many, a declining demand for fossil fuels could be an existential question for others. Not the least,

[11] Dirk Buschle, Kirsten Westphal, 'A challenge to governance in the EU: decarbonization and energy security', European Energy & Climate Journal, Volume 8, Issue 3-4, pp. 53-64.
[12] International Renewable Energy Agency (IRENA), 'A New World: The Geopolitics of the Energy Transition', 2019, link here.
[13] Indra Overland, Morgan Bazilian, Talgat Ilimbe Uulu, Roman Vakulchuk, Kirsten Westphal 'The GeGaLo Index: Geopolitical Gains and Losses after Energy Transition', Energy Strategy Reviews, no. 26, November 2019, link here.

fossil fuels represent one of the biggest – if not the biggest – sources of fiscal revenues in many countries, while sustaining the employment of hundreds of millions in others. For instance, Russia's state-controlled gas and oil companies Gazprom and Rosneft account for approximately 12% of the country's Gross Domestic Product (GDP), and over 25% of state fiscal revenues.[14] China's National Petroleum Company employs around half a billion people, in the world's largest consumer and producer of coal by far.[15]

The future of oil seems to be questionable in any scenario, and even if natural gas could buy more time as a 'transitory fuel', eventually the impact is unavoidable.[16] In a matter of decades, any revenue and asset related to fossil fuels would significantly lose its value, if not converted to a liability: Mercure et al. estimate future global wealth loss from fossil fuels 'stranded assets' in the range of USD 1 to 4 trillion.[17]

In cases where energy rents are used as a trade-off for repression – such as in the so-called 'petrostates' and authoritarian regimes – the austerity provoked by the absence of petroleum resources can 'potentially fracture the state's legitimacy, possibly leading to social unrest, political infighting, and even violence.'[18] In the worst-case scenario, this would lead to a 'power vacuum' in some countries, in what could be one of the biggest security risks of the energy transition.[19]

Though obviously different, the risks of phasing-out fossil fuels for those on the other side of the table, relying on energy imports, are significant: China faces the Herculean effort of shutting down the biggest coal industry of the world without incurring significant economic

[14] Andreas Goldthau, Caroline Kuzemko, and Michael F. Keating, *op. cit.*
[15] Our World in Data, 'Annual CO2 emissions from coal', 2021, link here.
[16] Thijs Van de Graaf, 'Battling for a Shrinking Market: Oil Producers, the Renewables Revolution, and the Risk of Stranded Assets', in Scholten, Daniel (ed), 'The geopolitics of renewables', Springer Nature, 2018.
[17] J.F. Mercure et al, 'Macroeconomic impact of stranded fossil fuel assets', Nature Climate Change, Volume 8, 2018, pp. 588-593, link here, cited in Dawud Ansari, Franziska Holz, 'Between stranded assets and green transformation: Fossil-fuel-producing developing countries towards 2055', World Development 130, 2020, link here.
[18] Remark made by General Tom Middendorp, former Chief of Defence of the Armed Forces of the Netherlands, Oslo, June 24, 2018, cited in International Renewable Energy Agency (IRENA), *op. cit.*
[19] *Ibid.*

and social losses. Most European countries will need to reinvent and transform economies that have been operating with fossil fuels for decades.

Renewables have the potential to compensate for the loss, even if partly. For instance, the North Africa and the Middle East regions enjoy world-class potential to produce electricity out of renewables and, thus, other forms of renewable energy out of electricity, such as hydrogen by electrolysis.[20] Even in those cases where renewable sources are less available, they allow a degree of exploitability in the absence of resources that fossil fuels never permitted, explaining why Germany became a front-runner in the production of solar power.[21]

To the extent that renewables come from naturally replenishing sources that are widely available, they have the potential to 'democratize' access to energy. The incentive to enter into disputes for energy supply, therefore, would be smaller: countries would rather look for alternatives or directly produce more energy at home if the premium risk of imported energy becomes too high.[22] Moreover, one could argue that abandoning petroleum resources would bring a less conflictual world, to the extent that they combine an exceptional economic and strategic value that has 'cursed' many states, making oil and gas subject to fierce competition and even military interventions.[23] This is often referred to as the 'peace' or 'security dividend' of the energy transition.[24]

Renewables, however, present a number of issues, as they

(1) demand a vast deployment of infrastructure and technologies;

(2) are 'intermittent' or limited in the amount of energy they can produce per unit of time;

[20] International Renewable Energy Agency (IRENA), *op. cit.*
[21] Dirk Buschle, Kirsten Westphal, *op. cit.*
[22] Indra Overland, 'The geopolitics of renewable energy: debunking four emerging myths', Energy Research & Social Science, no. 49, 2019, pp. 36-40, link here.
[23] Indra Overland, 'Future Petroleum Geopolitics', *op. cit.*
[24] Andreas Goldthau, Martin Keim, Kirsten Westphal, 'The Geopolitics of Energy Transformation: Governing the Shift: Transformation Dividends, Systemic Risks and New Uncertainties', Stiftung Wissenschaft und Politik, SWP Comment 2018/C 42, 2018, link here.

(3) have less power density, requiring more surface to produce the same amount of energy;

(4) require a number of 'critical raw materials' due to their irreplaceable role in producing the structures and technologies that produce renewable energy.

Renewables bring opportunities, therefore, but also challenges. Most attention has gone to the cyber-threats of the energy transition and the security issues of increased competition over critical raw materials.[25]

4. Critical raw materials, oil and gas: repeating the history?

Competition for critical raw materials is often referred to as the main security issue of the energy transition.[26] Critical raw materials refer to a list of minerals and metals usually considered 'critical' or 'strategic' due to their role in producing renewable energy and related technologies. Jeffrey D. Wilson outlines three requisites for raw materials to be 'critical': (1) a material must be essential, with no practicable substitutes and limited scope for reducing demand; (2) production must be monopolised by one or a small number of countries, alongside an absence of alternative suppliers in the near term; (3) governments must have effective control over domestic actors, and the capacity to bear the political and economic costs of restricting supply.[27]

In the context of the energy transition, critical raw materials are typically compared to oil and gas: as the energy transition advances and demand for these minerals and metals grows, so will do the competition for them, whose risks might well reach the energy security sphere of many countries – and, obviously, condition the deployment of renewables and key

[25] Roman Vakulchuk, Indra Overland, Daniel Scholten, 'Renewable energy and geopolitics: A review', Renewable and Sustainable Energy Review, no. 122, January 2020, link here.
[26] *Ibid.*
[27] Jeffrey D. Wilson, 'Whatever happened to the rare earths weapon? Critical materials and international security in Asia', Volume 14, Issue 3, pp. 358-373, link here.

technologies such as electric batteries, vehicles, and grids. In the worst-case scenario, they can compromise the energy transition itself if shortages were to happen.

Much of these concerns are over rare earths and China. China produces around 60% of the total global output of rare earths, while having precedents of purposely disrupting supply for geopolitical purposes, such as over a maritime dispute with Japan. [28] Other cases would include cobalt, copper, graphite, or nickel, whose production is highly concentrated in a few countries that are often prone to political instability, and lithium, in light of the rapidly increasing demand for electric batteries and vehicles, whose reserves are equally concentrated in the hands of few producers.[29]

Table 1: Selected raw materials, and share of world reserves by country (% rounded).

Raw material	Share of global reserves (%)		
Bauxite	Guinea (24%)	Australia (17%)	Vietnam (12%)
Chromium	Kazakhstan (40%)	South Africa (35%)	India (17.5%)
Cobalt	Congo, Dem. Rep. (51%)	Australia (20%)	Cuba (7%)
Copper	Chile (23%)	Peru (11%)	Australia (10%)
Graphite	Turkey (28%)	China (23%)	Brazil (22%)
Lithium	Chile (44%)	Australia (22%)	Argentina (9%)
Manganese	South Africa (40%)	Brazil (21%)	Australia (18%)
Molybdenum	China (46%)	Peru (16%)	United States (15%)
Nickel	Indonesia (22%)	Australia (21%)	Brazil (17%)
Rare earths	China (36%)	Vietnam (18%)	Brazil (17.5%)
Silicon	China (68%)	Russia (7%)	Brazil (4%)
Zinc	Australia (27%)	China (17.6%)	Russia/Mexico (9%)
Oil	Venezuela (17.5%)	Saudi Arabia (17%)	Canada (10%)
Natural gas	Russia (24%)	Iran (17%)	Qatar (12%)
Coal	United States (24%)	Russia (15%)	Australia (14%)

Source: Created by the author with data from the BP Statistical Review, US Geological Survey (2021).[30]

[28] Keith Bradsher, 'Amid Tension, China Blocks Vital Exports to Japan', The New York Times, September 2010, link here; Chuin-Wei Yap, 'China Ends Rare-Earth Minerals Export Quotas', The Wall Street Journal, January 2015, link here.

[29] Clare Church, Alec Crawford, 'Minerals and the Metals for the Energy Transition: Exploring the Conflict Implications for Mineral-Rich, Fragile States', in Manfred Hafner, Simone Tagliapietra (eds), 'The Geopolitics of the Global Energy Transition', Springer, 2020, pp. 279-304, link here.

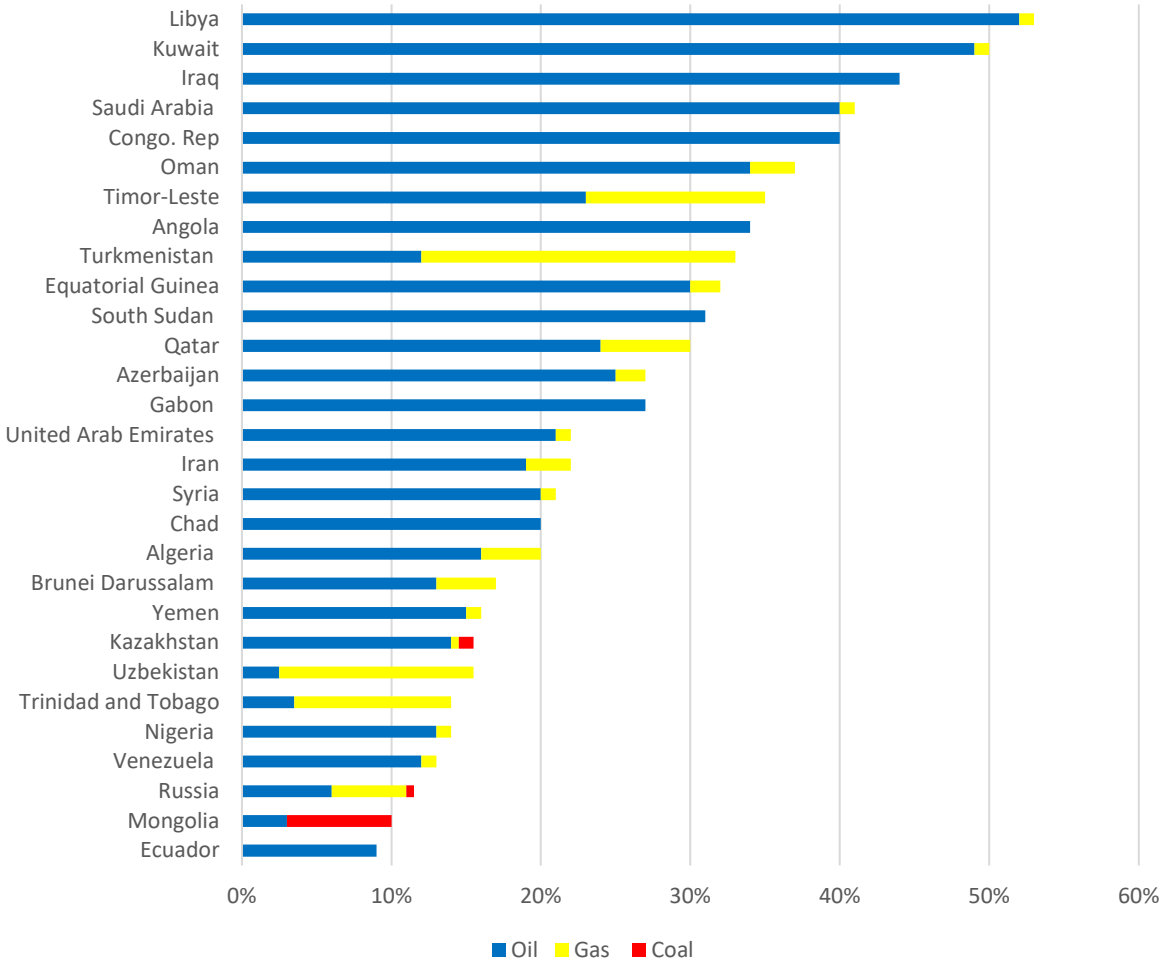
[30] Not all the 17 rare earths are included in the report, and silicon percentages refer to production: reserves are ample in major producing countries and quantitative estimates are not available. See U.S. Geological Survey, 'Mineral commodity summaries 2021', link here; British Petroleum (BP), BP Statistical Review of World Energy, 2021, link here.

Notwithstanding the geopolitical challenges that these minerals and metals would prompt, it is unlikely that they would trigger the same security issues or create the same dependencies as oil and gas. Their economic value is far lower. The market value of oil alone is approximately USD 3 trillion.[31] In contrast, the value of key minerals and metals would represent, at their peak (maximum demand is expected by mid-2040), between 3 and 10% of the value of the oil market in 2016.[32] The economic consequences and incentive to enter disputes over critical materials would be much smaller.

For this same reason, it is also unlikely that raw materials lead to the creation of cartels between producing countries. They would be less profitable, if at all, and would probably lead to an increased perception of scarcity among importers, triggering additional investments in alternatives and partnerships against hostile producers.[33] Equally, the revenue-to-GPD ratio in countries producing oil and gas is difficult to replicate, which contradicts the arguments favouring a new 'resource curse' for critical raw materials.[34] Currently, up to 29 countries have more than a 10% of their wealth coming from fossil fuels – some of them over 40% (see Figure 1). Critical minerals and metals would account for around a 1% GDP increase in the vast majority of cases.[35]

[31] BP Statistical Review of World Energy, *op. cit.*
[32] André Månberger, Bengt Johansson, 'The geopolitics of metals and metalloids used for the renewable energy transition', Energy Strategy Reviews, Volume 26, 2019, link here.
[33] Jeffrey D. Wilson, *op. cit.*
[34] The 'resource curse' refers to the adverse effects in countries with an abundance of natural resources, e.g. fossil fuels and certain minerals, having less economic growth, less democracy, or worse development.
[35] André Månberger, Bengt Johansson, *op. cit.*

Figure 1: Fossil fuel rents as a percentage of GDP in selected countries (average 2007-16)



Source: IRENA (2020).[36]

As for rare earths, they are not rare and can be found in relevant quantities in several locations, including Vietnam, Brazil, Australia, Greenland, India, the United States, and the European continent itself.[37] It is the high costs of mining, and complex separation, processing, and capital intensity that complicate production. But these costs would likely decrease as demand and investments for renewables increase.[38]

Furthermore, weaponizing rare earths would likely backfire: supply disruptions and trade disputes would only increase the perception of scarcity for these group of metals, incentivising new partnerships and investments in alternatives, while new producers would

[36] International Renewable Energy Agency (IRENA), *op. cit.*
[37] Indra Overland, 'debunking four emerging myths', *op. cit.*
[38] *Ibid.*

see the opportunity of entering a market hit by rising prices. This is exactly what happened with the Chinese rare earths embargo to Japan in 201.[39]

Not least, the energy transition is mostly about innovation, subject to a high degree of technological progress where potential breakthrough innovation could lead to the substitution of 'problematic' raw materials, or to an increase of the recycling rates. New actors mining 'substitutes' and recycling would further extend the list of suppliers, expanding a market of both primary and secondary raw materials providers, inherently enhancing diversification. Some estimates even foresee an overtaking of recycled critical materials over primary ones as of 2040.[40]

Table 2: Data and assumptions on recycling and substitution rates in selected raw materials.

Raw material	Recycling rate[41]		Recycling rate (2040)[42]	Substitution[43]
Bauxite	-		-	Low
Chromium	25%		-	Low
Cobalt	30%		80%	Low
Copper	40%		80%	Medium
Graphite	-		-	Medium
Lithium	10%		80%	Low
Manganese	45%		80%	None
Molybdenum	40%		-	Low
Nickel	60%		80%	Medium
Rare earths[44]	15%		-	Low
Silicon	0%		80%	High
Zinc	30%		-	High
Petroleum resources	0%		-	-

Sources: Created by the author with data from the U.S Geological Survey (2021); André Månberger and Bengt Johansson (2019).

[39] Jeffrey D. Wilson, *op. cit.*
[40] André Månberger, Bengt Johansson, *op. cit.*
[41] Recycling accounts for the quantity recycled as a percent of the material in waste streams for products that have reached their end of life. Based on the estimates of André Månberger and Bengt Johansson. See André Månberger, Bengt Johansson, *op. cit.*
[42] *Ibid.*
[43] We use the term 'Low' when the alternatives to the specific raw material are 'not competitive', 'potential' or only possible in few secondary uses; 'Medium' when there are several alternatives in secondary-uses, and none or no competitive alternatives in primary uses; and 'High' when there are alternatives for primary uses only, or for both primary and secondary.
[44] Not all the 17 rare earths are included.

Which critical materials will be sought-after in thirty years is hard to predict, and the current geographical assessments are not always trustable, with discoveries highly probable in the coming decades as more attention is placed over these minerals and metals. New forms of mining would also become profitable as demand increases, including offshore, under the sea.[45]

It is important to note that the extent to which competition for critical materials will bring additional security risks and dependency issues would be inextricably conditioned to the political stability of individual producing countries, the strategies of the respective importing countries, and the overall geopolitical landscape, including in areas other than raw materials or renewable energy, which is equally difficult to anticipate. However, these will hardly replicate or aggravate old geopolitical disputes for energy.

5. The EU and the energy transition: old wine in new bottles?

European integration finds energy and geopolitics in its roots 'to make war not merely unthinkable, but materially impossible.'[46] Yet, framing the EU within mainstream concepts of geopolitics is complex.

Its capacity to exert power is constrained by its own competencies. Nevertheless, the EU can and does exert power through its regulatory and normative activity and the subsequent enforcement of rules. Though far from traditional forms of power, the EU's ability to promulgate legislative texts and enforce rules constrains third countries and companies pursuing operations in the world's largest single market, while exporting those same rules and standards abroad, in what has been termed the 'Brussels effect'.[47]

[45] Yutaro Takaya et al, 'The tremendous potential of deep-sea mud as a source of rare-earth elements', Scientific Reports, 8, 2018, link here; cited in André Månberger, Bengt Johansson, *op. cit.*
[46] Schuman Declaration, May 1950.
[47] Anu Bradford, 'The Brussels Effect: How the European Union Rules the World', Oxford University Press, New York, 2020.

Throughout the years – and reacting to the events rather than proactively – the EU turned a weakness into a strength. It progressively equipped itself with a set of tools using the competencies it does have, acquiring a degree of 'actorness' at the global level that it has used to advance geopolitically motivated goals.[48] To the extent that energy policy is a shared competence between the EU and its Member States, and that the internal energy market is part of this equation, the EU is by definition an international energy actor in its own right. [49]

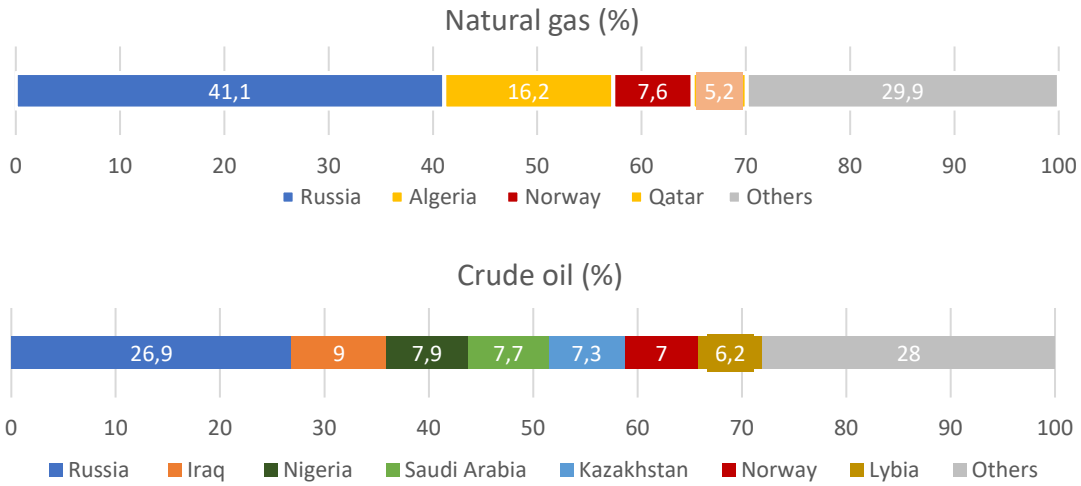
5.1. The geopolitics of a decarbonised EU

The EU's energy policy and legislation are largely defined by the scarce reserves of fossil fuels in the European continent, which inevitably obliges it to rely and depend on the energy resources of third countries. The net effect is that the EU imports around 90% of its crude oil, 70% of natural gas, and 40% of coal and uranium, at a net cost of nearly €1 billion per day.[50]

Though the EU does not pursue autarky, nor is self-sufficiency a realistic goal, its excessive dependence adds a significant political and financial burden on the shoulders of the EU Member States. Most of the EU's headaches on energy security start and finish in the same place: Russia, which supplies over 40% of natural gas, 27% of crude oil, and around 47% of coal and other solid fuels. Having used energy resources as a geopolitical weapon in the past, the dependence of most EU Member States on Russia's supply inevitably conditions the security of the whole bloc, well beyond the energy remit.[51]

[48] Andreas Goldthau, Nick Sitter, 'Soft power with a hard edge: EU policy tools and energy security', Review of International Political Economy, Volume 22, Issue 5, 2015, pp. 941-96, link here.
[49] *Ibid.*
[50] Eurostat, 'Shedding light on energy in the EU - A guided tour of energy statistics', retrieved 05/05/2020, link here.
[51] *Ibid.*

Figure 2: EU imports of fossil fuels by source (%)



Source: Created by the author with data from Eurostat (2019).

Against this background, and the imperative of preventing the catastrophes of global warming, the EU has committed to becoming the first climate-neutral continent by 2050 under the 'European Green Deal'.[52] The European Green Deal implies a dramatic reduction of fossil fuel consumption in Europe by 2050: coal imports would virtually disappear, natural gas would decrease by 58-67%, and crude oil by 78-79%.[53]

This would probably bring a net geopolitical gain to the EU: by reducing its dependency on energy resources, the bloc would enhance its security of supply while increasing the domestic production of renewable energy, where it is already a global frontrunner.[54] Developing a 'green' industry at the vanguard of the global energy transition with the objectives of the European Green Deal and subsequent legislation.[55] Moreover, this process would contribute to strengthening other geopolitical variables such as the role of the euro vis-

[52] European Commission, 'Communication from the commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: The European Green Deal', COM(2019) 640 final, 11 December 2019, link here.
[53] European Commission, 'Impact Assessment accompanying the document: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Stepping up Europe's 2030 climate ambition', SWD(2020) 176 final, 17 September 2020, link here.
[54] Eurostat, 'Renewable energy statistics', January 2022, retrieved 02/03/2022, link here.
[55] 'The European Green Deal', *op. cit.*

à-vis the US dollar – which currently dominates international energy transactions – or the export of the EU's regulatory and normative standards at the global level.

A decarbonised EU, however, would also imply serious geopolitical challenges at the domestic, regional, and international levels.

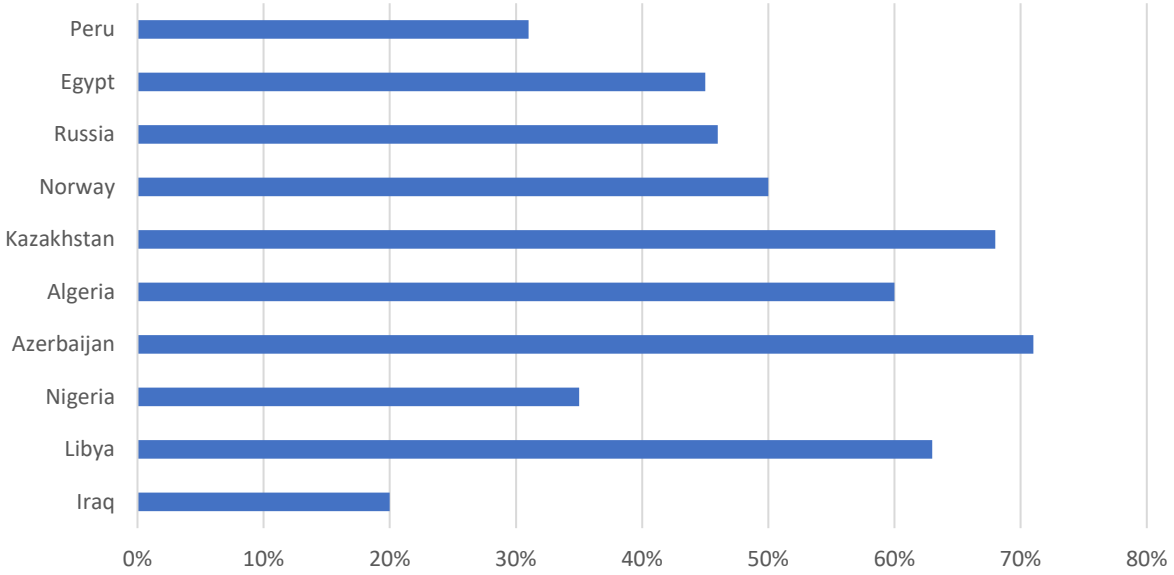
Within its borders, it is not entirely clear how some Member States will manage to phase out fossil fuels without too much economic and social difficulty. While the reasons differ by Member State, low diversification and the excessive reliance on coal would be among the main obstacles for the continent to evenly decarbonise. [56] Taking the latter example: coal-fired plants and the coal mining industry alone employ around 237 000 people in Europe – the majority of them in Poland, followed by Germany, Czechia, Bulgaria, Romania, Greece, and Spain.[57] And while Germany's economy would likely help these sectors absorb the hit, others would have more challenges.[58] Equally, not all Member States are prepared to deal with rising energy prices derived from the phase out of fossil fuels, even if transitory. Addressing the distributional effects and social consequences of the energy transition might well determine the success of Europe in decarbonising its economies: 'If we leave citizens or regions behind, the transition will not happen. The transition will happen in a fair way or it will not happen, because people will then not accept it.'[59] The experience of the 'yellow vests' protests – *gilets jaunes* – in France remains very telling, in this respect.

At the regional level, the climate ambitions of the EU could be seen as a threat, if not as hostile behaviour from Europe – from those that depend on the European energy market. Countries like Algeria, Libya, Egypt, Saudi Arabia, Azerbaijan, Kazakhstan, Russia would

[56] Indra Overland, Morgan Bazilian, Talgat Ilimbe Uulu, Roman Vakulchuk, Kirsten Westphal, *op. cit.*
[57] Patricia Alves Dias, et al., 'EU coal regions: opportunities and challenges ahead', Publications Office of the European Union, 2018, link here.
[58] *Ibid.*
[59] European Commission, 'Executive Vice-President Frans Timmermans in discussion panel at the Katowice European Economic Congress', 3 September 2020, retrieved 26/12/2021, link here.

lose an important – if not the most important – export market for petroleum resources which may destabilise them economically and politically.[60]

Figure 3: Fossil fuel exports to the EU as % of total fossil fuel exports.



Source: Mark Leonard, Jean Pisani-Ferry, et al. (2021).[61]

As the EU is the second-largest net importer of crude oil, a drop in demand would likely depress prices globally.[62] New forms of cooperation based on renewables could temper the geopolitical consequences of a decarbonised EU. For instance, the EU could take advantage of its geographical proximity with Africa and the Middle East and decades of relations based on petroleum trade, while contributing to their potential to produce energy out of renewables including 'blue' or 'green' hydrogen.[63] Supporting their energy transition would also reinforce bilateral relations against the fall of petroleum demand and legitimate the EU's push for decarbonisation, and eventually give place to new forms of trade, be it electricity, hydrogen,

[60] Simone Tagliapietra, Georg Zachmann, Ottmar Edenhofer, Jean-Michel Glachant, Pedro Linares, Andreas Loeschel, 'The European Union Energy Transition: Key Priorities for the Next Five Years', Bruegel, Policy Brief, July 2019, link here.
[61] Mark Leonard, Jean Pisani-Ferry, Jeremy Shapiro, Simone Tagliapietra, Guntram Wolff , 'The geopolitics of the European Green Deal', Bruegel, Policy Contribution 04/2021, 2021, link here.
[62] *Ibid.*
[63] Jan Cienski, America Hernandez, 'Why carbon-free Europe will still need North African energy', 21 June 2020, retrieved 17/01/2021, link here.

or key technologies such as batteries, photovoltaic panels, wind turbines, or critical raw materials.[64]

Similar opportunities would lie in the Eastern neighbourhood, where supporting the energy transition locally would reinforce the position of the EU as a partner, rather than as a security threat. New forms of cooperation would move trade away from oil, coal, and gas and would protect and prevent from obsolescence the vast web of pipelines and infrastructure already connecting Eastern and Central Europe, while helping to prevent a tough energy transition in the surroundings of the EU.

If the EU is to claim leadership in the energy transition, it should actively support other regions and countries to smoothly phase out fossil fuels, especially those that heavily depend on the European market. Supporting the transition of low-and-middle-income countries should be seen as a question of strategic nature, where the grass-roots success of national industries and societies in the energy transition would legitimate the European push for the global energy transition and even contribute to meet their development. It is in the EU's interest to finance, prioritise partnerships with exposed suppliers, and actively support the smoothest and most peaceful possible switch from fossil fuels to cleaner forms of energies and technologies.

Given the need for unanimity of its Member States to deploy 'hard' power, the EU would be best positioned to deal with the geopolitics of the energy transition through norms and markets. The alternative is a turbulent energy transition that could further destabilise countries and regions that are already prone to political turmoil.

[64] Zainab Usman, Olumide Abimbola, Imeh Ituen, 'What Does the European Green Deal Mean for Africa?', Carnegie Endowment for International Peace, 2021, link here.

5.2. Critical raw materials: is China the new Russia?

The EU is not alien to the security and dependency risks of critical raw materials. In the words of the then Vice-President of the European Commission for the Energy Union Maroš Šefčovič:

> I really think that, when it comes to the issue of dependency, we could end up in a situation where raw materials become the new oil. We have to be very vigilant that today's dependency on fossil fuels like oil and gas is not replaced by dependency on lithium, cobalt, copper, and other raw materials that we need for the green transition.[65]

This perspective is well-reflected in the language that the European Commission has used since the launch of the European Green Deal, where the terms 'security', 'strategic', 'dependency' or, indeed, 'critical' appear regularly when defining the issue of raw materials in the energy transition. The European Council recently endorsed this position and recognised that 'the nature of energy security is evolving from concerns about access to fossil fuels at affordable prices sourced on volatile markets, towards the need to secure access to the critical raw materials.'[66]

The following table summarises the terms used in this and other selected documents by the European Commission and the European Council to describe the issue of critical raw materials.[67]

[65] Frédéric Simon, "EU's Sefcovic: Real risk that 'raw materials become the new oil", EURACTIV, 20 November, 2018, retrieved 18/12/2021, link here.
[66] Council conclusions on Climate and Energy Diplomacy - Delivering on the external dimension of the European Green Deal´, 5263/21, 25 January 2021, link here.
[67] European Commission, 'The European Green Deal', *op. cit;* Communication from the Commission, 'A New Industrial Strategy for Europe', COM(2020) 102 final, 10 March 2020, link here; 'Communication from the Commission to the European Parliament and the Council, '2020 Strategic Foresight Report', COM(2020) 493 final, 9 September 2020, link here; Council conclusions on Climate and Energy Diplomacy, *op. cit.*

Table 3: Selected EU documents, and terms used to describe 'critical raw materials'

Key documents	Terms
European Green Deal [COM(2019) 640]	'Access to resources is also a strategic security question (…) Ensuring the supply of sustainable raw materials, in particular of critical raw materials (…) by diversifying supply from both primary and secondary sources, is, therefore, one of the pre-requisites to make this transition happen.'
Council conclusions - Delivering on the The external dimension of the European Green Deal [ST 5263/21]	'The Council recognises that the nature of energy security is evolving from concerns about access to fossil fuels at affordable prices sourced on volatile markets, towards the need to secure access to the critical raw materials and technologies necessary for the energy transition whilst avoiding new dependencies, as well as ensuring resilient supply chains, cybersecurity and the protection and climate adaptation of all, and in particular, 'critical' infrastructure.'
Industrial Strategy [COM(2020) 102]	'With the transition of Europe's industry to climate-neutrality, the reliance on available fossil fuels could be replaced with reliance on non-energy raw materials, many of which we source from abroad and for which global competition is becoming more intense. Boosting recycling and the use of secondary raw materials will help reduce this dependency.'
Strategic Foresight Report [COM(2020) 493]	'Addressing over-dependency on non-EU countries for critical raw materials, such as graphite, cobalt, lithium and rare earths, is therefore one of the crucial elements to bolster Europe's open strategic autonomy in key technologies needed to achieve a carbon-neutral and digital society.'

Source: European Commission.

Similarly to gas and oil, the EU is between 75% and 100% dependent on imports for most critical raw materials, while supply is highly concentrated: China alone supplies to the EU over 40% of the total list of 'critical' raw materials, including 47% of graphite and almost 100% of rare earths.[68]

[68] European Commission, 'Study on the EU's list of Critical Raw Materials – Final Report', Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, 2020, p. 9, link here; The Commission assesses 'critical raw materials' based on two parameters: (1) economic importance; and (2) level of risk to supply, i.e. considering their geographical concentration, governance performance and trade aspects. Those metals and minerals that rank high in both are included in a list – Critical Raw Materials (CRM) list – aimed to inform other policies on the level of protection and attention they deserve. The latest list (2020) includes 30 metals and minerals. See European Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability', COM(2020) 474 final, 3 September 2020, link here;

These figures have led to the comparison of raw materials with petroleum resources and, notably, whether Chinese raw materials will end up perpetuating the EU's energy security issues by simply replacing the dependency on Russian natural gas:

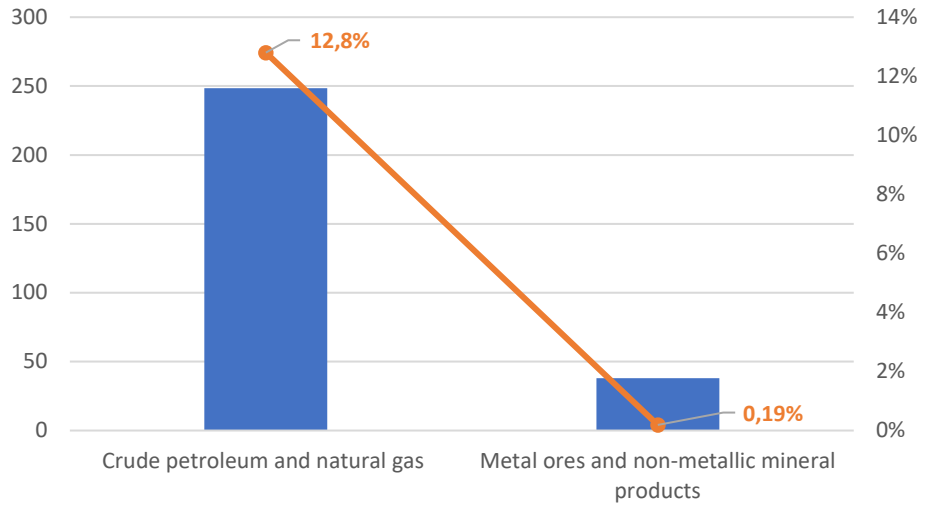
> After the energy transition the geopolitical dispute will be the same but with different factors: hydrocarbons will give way to other minerals and raw materials necessary for the decarbonisation of society – lithium, rare earths, cobalt – so there will continue to be a large Europe's dependence on third countries.[69]

Europe's self-sufficiency in critical materials is not realistic, and decarbonising will inevitably demand relying on external supply to a higher or lesser degree. Of course, the extent to which the EU has to import critical raw materials would condition whether new dependencies and vulnerabilities arise or not – be it over China or any other supplier. However, this does not mean that critical raw materials will necessarily bring the same headaches to the EU, not even in the most pronounced cases such as rare earths. In fact, Chinese raw materials will hardly be as problematic as the dependence that Europe has vis-à-vis Russian natural gas.

Petroleum resources have, as mentioned, an exceptional value that transcends the logics of any other commodity or natural resource. They condition international relations and the global economy in a way that has no equivalent.[70] Even if other critical raw materials are in some cases more geographically concentrated, their value – economic and 'strategic', current and expected – is simply much lower, which automatically diminishes the consequences and, therefore, incentive of any supply disruption in the EU for geopolitical purposes. In the EU, oil and gas accounted for around 250 billion euros of trade, representing around 13% of the total in 2019, while minerals and metals – critical and non-critical – accounted for approximately 40 billion euros, representing around 0.20% of the total – that is, around 70 times less than oil and gas.

[69] Interview with Colonel Chief of Staff of the Spanish army in reserve/Security and Geopolitics Analyst, Bruges, 12 April 2020.
[70] Indra Overland, 'Future Petroleum Geopolitics', *op. cit.*

Figure 4: Value crude oil, natural gas, and minerals and metals imports, in billion euros, and their percentage out of total EU imports in 2019.



Source: Created by the author with data from Eurostat (2019).[71]

Moreover, the EU would be highly exposed to supply disruptions of Russian gas: in the case of a complete halt of supply that lasts longer than a few months, the EU would probably need to consider exceptional measures, including imposing demand curbs, forcing non-critical industries to shut down temporally, or mandatory quotas in energy consumption in offices and houses. [72] That, in addition to finding supply substitutes covering the Russian share, which would demand additional investments in new infrastructure to process it and, most importantly, probably higher energy prices – which can, in turn, prompt inflation.[73] While the economic and political consequences would depend on the gravity and duration of the supply embargo, it is unlikely that a cut in the supply of raw materials would do so much damage.

[71] Metal ore and non-metallic minerals include metallic minerals (ores), but also others such as uranium, aluminium (bauxite), copper, lead, zinc, tin, manganese, chrome, nickel, cobalt, molybdenum, tantalum, vanadium, as well as gold, silver, and platinum. See Eurostat, 'Main goods in extra-EU imports', April 2021, retrieved 20/01/2021, link here.
[72] Ben McWilliams, Giovanni Sgaravatti, Simone Tagliapietra, Georg Zachmann, 'Can Europe survive painlessly without Russian gas?', Bruegel, 27 January 2022, retrieved 09/02/2022, link here.
[73] Susanna Twidale, 'Explainer: Why Russia drives European gas prices', Reuters, 24 February 2022, retrieved 06/03/2022, link here.

The EU would be, in contrast, more prepared against supply disruptions of critical raw materials for renewable technologies than many would predict.[74]

The geographic proximity largely conditions the relations between the EU and Russia. Conflicts in neighbouring territories between the two blocs can easily permeate the energy supply of the whole European bloc, as the gas shortages over the crisis in Ukraine proved and the current invasion by Russia confirmed.[75] In this sense, the EU's excessive reliance on Russian gas – but also oil – heavily exacerbates the security issues of the whole continent by making its countries dependent on a regime that is openly hostile against the European values and the international liberal order. And while China is a 'systemic rival' of the EU, equally far from democratic and political values, Russia has proven to be a much more problematic partner.

Furthermore, EU-Russia relations are almost exclusively about energy, representing around 60% of the total trade between the two. In contrast, in EU-China trade energy products account for only 5% of the total. Even when adding minerals and metals and key technologies such as electric batteries and vehicles, wind turbines, and photovoltaic panels, all combined, they still represent a relatively modest 10% in comparison to the EU trade share of Russian coal, oil and gas.[76]

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[74] The Commission's Joint Research Canter recently assessed the capacity of the EU before supply shortages and bottlenecks of critical raw materials along supply chain for the deployment of wind and solar power, and electric vehicles: Among its findings, most of the metals studied were rated with medium or high resilience, provided progress in certain mitigation measures, such as mining and recycling. The exceptions were two type of rare earths – neodymium and praseodymium – for which the EU´s resilience remains low in any given scenario by 2030. See Darina T. Blagoeva, Patrícia, Alves Dias, Alain Marmier, Claudiu C. Pavel, 'Assessment of potential bottlenecks along the materials supply chain for the future deployment of low-carbon energy and transport technologies in the EU. Wind power, photovoltaic and electric vehicles technologies, time frame: 2015-2030', Joint Research Centre, European Commission, Brussels, 2016, link here.

[75] Laura Rodríguez-Fernández, Ana Belén Fernández Carvajal, Luis Manuel Ruiz-Gómez, 'Evolution of European Union's energy security in gas supply during Russia–Ukraine gas crises (2006–2009)', Energy Strategy Reviews, Volume 30, July 2020, link here.

[76] European Commission, 'China-EU - international trade in goods statistics: EU-China trade by type of goods', Eurostat, 2021, retrieved 26/12/2021, link here; European Commission, 'EU imports of energy products - recent developments: Share of energy products in total EU imports', Eurostat, 2021, retrieved 26/12/2021, link here; European Commissions, 'International trade in products related to green energy', Eurostat, October 2021, retrieved 21/01/2022, link here.

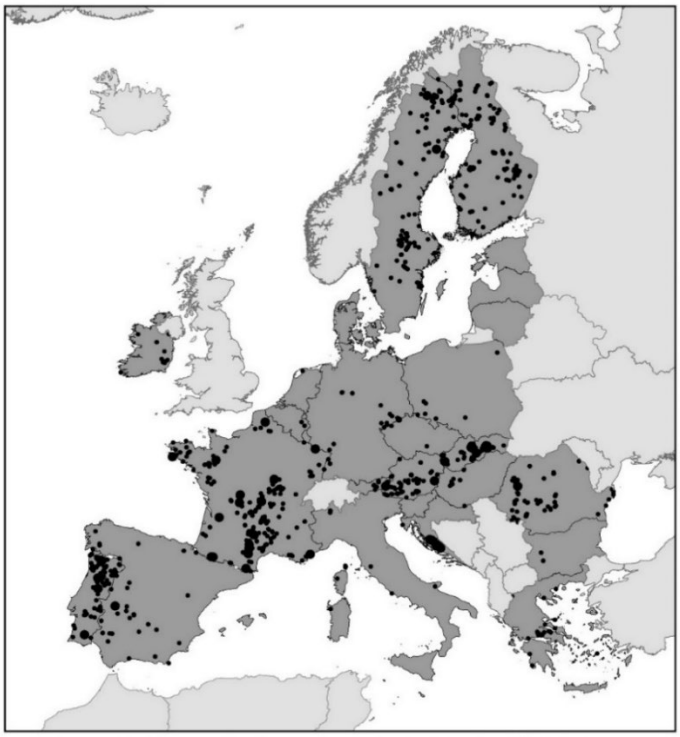
EU-China relations are complex – more complex than energy or critical raw materials alone. Thus, any dependency vis-à-vis China and vice versa should be seen in the wider geopolitical context that defines its relations with the EU, where disagreements in one area can quickly reverberate in a totally different area.[77] In any case, these disputes would hardly achieve the military and territorial level, as it happens with Russia, where energy or critical raw materials supply could become weapons of war. We should be careful of assumptions in applying the same logics but it would be prudent to affirm that critical raw materials will hardly replicate the dependences and security issues of the EU on the energy resources of Russia. In fact, reducing dependence on Russian natural gas will be, by itself, a net geopolitical gain for Europe.

5.3. Old wine in new bottles?

Contrary to fossil fuels, whose scarce reserves inevitably limit the capacity of the EU and its Member States to produce oil, gas and coal in European soil, the energy transition would allow a degree of autonomy in the production of renewables, critical raw materials and, thus, technologies for the energy transition. There are known reserves of critical raw materials in the European continent, and the majority of them are yet to be exploded.[78] Some of these deposits happen to be, moreover, in so-called 'coal-regions' where new mining projects of critical materials would help compensate for the social impacts of the energy transition while taking advantage of the extensive know-how accumulated through decades of coal mining.[79]

[77] Andrew Small, 'The meaning of systemic rivalry: Europe and China beyond the pandemic', European Council on Foreign Relations, May 2020, link here.
[78] 'Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability', *op. cit*
[79] European Commission, 'Study on the resilience of critical supply chains for energy security and clean energy transition during and after the COVID-19 crisis', Directorate-General for Energy, June 2021, p. 113, link here.

Figure 5: Potential deposits of critical raw materials in the EU



Source: European Commission (2020).[80]

Mining projects, however, require extended periods – in some cases, decades – until production becomes profitable and the respective mineral or metal reaches the market.[81] But it is plausible that, as demand for critical materials and investments grow, new projects will be developed, new deposits will be discovered, and new forms of mining minimising the environmental impact – and, thus easing social acceptance – will become profitable. And the same would hold true for the innovation and technological progress surrounding the production, substitution, and recycling of raw materials.

In this sense, the energy transition allows a greater degree of autonomy and domestic production of any given technology or raw material, provided that a sufficient degree of innovation and industrial capacity is developed. The European Commission has put forward specific initiatives in this direction. These include, notably, sectoral industrial alliances such

[80] 'Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability', *op. cit*.
[81] Indra Overland, *op. cit.*

as the Electric Batteries Alliance (EBA). Such initiatives take the form a cooperation between stakeholders throughout the battery supply chain thanks to which Europe could become the second world manufacturer of lithium-ion battery cells by 2024, with an estimated global production share of 14.7%, and 16.6% by 2029, compared to 5.9% in 2019 when it was launched.[82] An equivalent alliance on raw materials (ERMA) launched in September 2020 has already identified projects with the potential 'to cover around 60% of the EU annually installed wind energy capacity by rare earths magnets' and 'increase production from 10,000 tonnes to 100,000 tonnes nickel capacity per year, representing 20% of projected EU annual demand in 2030,' respectively.[83]

Beyond the industrial remit, the EU can leverage the policy instruments it does have towards achieving the highest degree possible of autonomy in the production of critical raw materials and subsequent technologies – intra and extra EU.

[82] European Commission, 'Commission Staff Working Document: Strategic dependencies and capacities' accompanying the 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery', SWD(2021) 352 final, 5 May 2021, Brussels, link here.
[83] *Ibid.*

Table 4: Selected policy instruments at EU disposal in the area of raw materials.

Policy instruments	
Intra-EU	**Extra-EU**
European Green Deal	
Industrial Strategy, e.g. Critical Raw Materials Action Plan; Strategic Foresight Report; sectorial industrial alliances	Common commercial policy, e.g. dedicated chapters on energy and raw materials in free trade agreements; trade defence measures; leveraging EU's market.
Circular Economy Action Plan, e.g. sustainable product policy; secondary raw materials use.	'Green Deal diplomacy' and bilateral dialogues and agreements, e.g. existing partnerships on raw materials.
Research, e.g. Joint Research Centre ad-hoc studies; Horizon 2020 and Horizon Europe; European Institute of Innovation & Technology (EIT).	Cooperation through multilateral fora and international organisations, e.g. G20, WTO, UN, OECD.
Leveraging other policy areas, e.g., sustainable financing criteria (Taxonomy), Recovery and Resilience Facility (RRF), Projects of Common Interest (PCIs); state aid and tax reductions stimulating EU-based mining and production.	Investing in infrastructure abroad for developing raw materials value chains, e.g. the Global Gateway, European Investment Bank lending policy in third countries, ad-hoc financing for specific projects.

Source: Created by the author based on the policy recommendations of Trinomics and Artelys for the European Commission (2021).[84]

It can be acknowledged that, contrary to fossil fuels, the EU would have enough domestic resources to largely feed the energy transition, with the added value of innovation, recycling, and substitution. In sum, presenting a much less dependent energy landscape in what would be a more autonomous Union on energy – and, thus, security – matters.

The extent to which the EU will take advantage of this opportunity would be conditioned on 'counter[ing] potential risks through the creation of value chains, developing European innovation and technology capacity, creating value in Europe, supporting European companies and industries.'[85] In the words of an official from the Directorate-General for Energy (DG ENER) of the European Commission, 'if we are not capable to innovate, develop technologies and European value chains, energy security challenges will continue after the transition.' [86]

[84] 'Study on the resilience of critical supply chains for energy security and clean energy transition during and after the COVID-19 crisis', *op. cit.*
[85] Interview with a Commission official from the Directorate-General for Energy (DG ENER), Bruges, 20 April 2020.
[86] *Ibid.*

6. Conclusions

In this article, we have explored the main challenges and opportunities of the energy transition, from the perspective of geopolitics and the EU. The energy transition would leave winners and losers. While countries depending on external supply of fossil fuels would benefit, those heavily reliant on the rents of fossil fuels would lose a significant – if not the most significant – source of revenues, which could destabilise them economically and even politically, in some cases risking social unrest and violence. This would be one of the biggest security risks of the energy transition.

Renewables, however, have the potential to alleviate or, at least, temper the consequences. Renewables could bring a more balanced and less conflictual model of international politics, where more countries produce more of their own energy. Thus, they have the potential to reduce dependencies, enhancing energy security and the capacity of countries to satisfy their energy and development needs with fewer external constraints.

The energy transition and renewables, however, pose several challenges that will require sufficient attention. We have argued that, notwithstanding the importance and strategic nature of raw materials throughout the energy transition, these risks should not necessarily aggravate or replicate old geopolitical disputes for energy. If anything, they would be reduced:

(1) First, it is unlikely that renewables and the raw materials needed to produce them will achieve the economic and strategic value of oil and gas, which is exceptional and without equivalent. This, by itself, would reduce the economic consequences and, thus, the incentive to use raw materials as a geopolitical weapon.

(2) Second, the experience of the Chinese rare earths embargo on Japan remains very telling: weaponising critical raw materials would end up prompting investments in alternatives and new partnerships against the hostile supplier.

(3) Third, the scope of action of countries before supply disruptions related to energy would be wider, in any scenario, to the extent that there would be more countries and actors producing and supplying renewable energy and raw materials. Thus, as a rule, both would entail a more diversified supply compared to oil and gas.

(4) Fourth, the energy transition is all about innovation and technological progress. It is plausible that new forms of producing renewable energy and raw materials, including discoveries of new deposits, forms of mining, recycling, and substitution, will become possible and facilitate their production as demand increases.

The EU is in a favourable position to benefit from this process. The phasing-out of fossil fuels from the European economy would alleviate most of the bloc's headaches over external energy supply, while the domestic production of renewables would enhance its energy security. This would hold true, again, both for renewables and critical raw materials, whose concentrated supply in some cases has led to their comparison with petroleum resources – notably, whether Chinese raw materials will end up replacing Russian natural gas as a security issue for the EU.

However, this is, at best, difficult. The exposure of the EU to Russian energy supply is hard to replicate with any of the considered critical raw materials. Moreover, the hostile behaviour and geographical proximity with Russia inevitably permeates the energy and overall security of the continent. Ceasing to depend on Russian gas and oil would be a major geopolitical gain for the EU.

We have argued that Chinese critical raw materials cannot be compared with Russian natural gas; nor can any eventual dependency over Chinese raw materials be assessed with the same logics. The extent to which the EU gains or even leads the journey to a decarbonised world would be conditioned to creating value in the European continent, leveraging the tools and instruments it does have across the policy spectrum while countering the risks at the

domestic, regional, and international level. At the domestic level, it should address the distributional effects of the energy transition, where the fortune or misfortune of certain Member States and sectors of the European society could compromise the entire project of the energy transition. At the regional and international level, the EU should actively contribute to tempering the consequences and compensate the loss of decommissioning fossil fuels in countries dependent on fossil fuels – notably, those heavily dependent on the EU's energy market – while supporting the growth of renewables and national industries. This would help to legitimate the role of the EU pushing and leading the energy transition.

The alternative is a tough energy transition, successful or not, whose consequences might well reach and permeate the European borders, and even reach the military sphere if the phase out of fossil fuels prompts excessive instability and violence. This would be a more dangerous challenge to deal with than the energy transition itself, before the catastrophes and consequences of global warming arrive.

Bibliography

Alves Dias, P., et al., 'EU coal regions: opportunities and challenges ahead', Publications Office of the European Union, 2018, link here.

American Petroleum Institute, 'Oil & Natural Gas Contribution to U.S. Economy Fact Sheet', 2018, link here.

Ansari, Dawud; Holz, Franziska; 'Between stranded assets and green transformation: Fossil-fuel-producing developing countries towards 2055', World Development 130, 2020.

Blagoeva, Darina T.; Alves Dias, Patrícia, Alves Dias; Marmier, Alain; Pavel, Claudiu C.; 'Assessment of potential bottlenecks along the materials supply chain for the future deployment of low-carbon energy and transport technologies in the EU. Wind power, photovoltaic and electric vehicles technologies, time frame: 2015-2030', Joint Research Center, European Commission, Brussels, 2016, link here.

Bradford, Anu, 'The Brussels Effect: How the European Union Rules the World', Oxford University Press, 2019.

Bradsher, Keith; 'Amid Tension, China Blocks Vital Exports to Japan', The New York Times, 22 September 2010, link here;

British Petroleum (BP), BP Statistical Review of World Energy, 2021, link here.

Buschle, Dirk; Westphal, Kirsten, 'A challenge to governance in the EU: decarbonization and energy security', European Energy & Climate Journal, Volume 8, Issue 3-4, pp. 53-64.

Chuin-Wei, Yap; 'China Ends Rare-Earth Minerals Export Quotas', The Wall Street Journal, 5 January 2015, link here.

Cienski, Jan; Hernandez, America; 'Why carbon-free Europe will still need North African energy', 21 June 2020, link here.

Council of the European Uninion, 'Council conclusions on Climate and Energy Diplomacy - Delivering on the external dimension of the European Green Deal', 5263/21, 25 January 2021, link here.

European Commission, 'China-EU - international trade in goods statistics: EU-China trade by type of goods', Eurostat, 2021, link here.

European Commission, 'Commission Staff Working Document: Strategic dependencies and capacities' accompanying the 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery', SWD(2021) 352 final, 5 May 2021, Brussels, link here.

European Commission, 'Communication from the Commission to the European Parliament and the Council: 2020 Strategic Foresight Report', COM(2020) 493 final, 9 September 2020, Brussels, link here.

European Commission, 'Communication from the Commission: A New Industrial Strategy for Europe', COM(2020) 102 final, 10 March 2020, Brussels, link here.

European Commission, 'Communication from the Commission: The European Green Deal', COM(2019) 640 final, 11 December 2019, link here.

European Commission, 'EU imports of energy products - recent developments: Share of energy products in total EU imports', Eurostat, 2021, link here.

European Commission, 'Executive Vice-President Frans Timmermans in discussion panel at the Katowice European Economic Congress', 3 September 2020, link here.

European Commission, 'Impact Assessment accompanying the document: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Stepping up Europe's 2030 climate ambition', SWD(2020) 176 final, 17 September 2020, link here.

European Commission, 'International trade in products related to green energy', Eurostat, October 2021, link here.

European Commission, 'Renewable energy statistics', Eurostat, January 2022, link here.
European Commission, 'Shedding light on energy in the EU - A guided tour of energy statistics', Eurostat, link here.
European Commission, 'Study on the EU's list of Critical Raw Materials – Final Report', Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, 2020, link here.
European Commission, 'Study on the resilience of critical supply chains for energy security and clean energy transition during and after the COVID-19 crisis', Directorate-General for Energy, June 2021, link here.
Goldthau, Andreas; Keim, Martin; Westphal, Kirsten, 'The Geopolitics of Energy Transformation: Governing the Shift: Transformation Dividends, Systemic Risks and New Uncertainties', Stiftung Wissenschaft und Politik, SWP Comment 2018/C 42, 2018, link here.
Goldthau, Andreas; Kuzemko, Caroline; Keating, Michael F; 'The global energy challenge: Environment, development and security', Palgrave, 2015.
Goldthau, Andreas; Sitter, Nick; 'Soft power with a hard edge: EU policy tools and energy security', Review of International Political Economy, Volume 22, Issue 5, 2015, pp. 941-96, link here.
Hafner, Manfred; Tagliapietra, Simone (eds); 'The Geopolitics of the Global Energy Transition', Springer, 2020, pp. 279-304, link here.
International Energy Agency (IEA), 'Energy Security', December 2019, link here.
International Energy Agency (IEA), 'World Energy Outlook 2019', 2019.
International Renewable Energy Agency (IRENA), 'A New World: The Geopolitics of the Energy Transition', January 2019, link here.
Kuus, Merje; 'Critical geopolitics', Oxford Research Encyclopedia of International Studies, 2010.
Leonard, Mark; Pisani-Ferry, Jean; Shapiro, Jeremy; Tagliapietra, Simone; Wolff, Guntram, 'The geopolitics of the European Green Deal', Bruegel, Policy Contribution 04/2021, 2021, link here.
Månberger, André; Johansson, Bengt; 'The geopolitics of metals and metalloids used for the renewable energy transition', Energy Strategy Reviews, Volume 26, 2019, link here.
McWilliams, Ben; Sgaravatti, Giovanni; Tagliapietra, Simone; Zachmann, Georg; 'Can Europe survive painlessly without Russian gas?', Bruegel, 27 January 2022, retrieved 09/02/2022, link here.
Nye, Joseph S.; 'Soft Power: The Means to Success in World Politics', Public Affairs, New York, 2004.
Ó Tuathail, Gearóid; Dalby, Simon; Routledge, Paul; 'The Geopolitics Reader', Routledge, New York, 1998, link here.
O'Sullivan, Meghan; Overland, Indra; Sandalow, David; 'The geopolitics of renewable energy', Center on Global Energy Policy, Columbia University, New York, 2017, link here.
Our World in Data, 'Annual CO2 emissions from coal', 2021, link here.
Overland, Indra; 'Future Petroleum Geopolitics: Consequences of Climate Policy and Unconventional Oil and Gas', Handbook of Clean Energy Systems, 2015, link here.
Overland, Indra; 'The geopolitics of renewable energy: debunking four emerging myths', Energy Research & Social Science, no. 49, 2019, link here.
Overland, Indra; Bazilian, Morgan; Ilimbek Uulu, Talgat; Vakulchuk, Roman; Westphal, Kirsten; 'GeGaLo Index: Geopolitical Gains and Losses after Energy Transition', Energy Strategy Reviews, no. 26, November 2019, link here.
Rodríguez-Fernández, Laura; Fernández Carvajal, Ana Belén; Ruiz-Gómez, Luis Manuel; 'Evolution of European Union's energy security in gas supply during Russia–Ukraine gas crises (2006–2009)', Energy Strategy Reviews, Volume 30, July 2020, link here.

Scholten, Daniel (ed), 'The geopolitics of renewables', Springer Nature, 2018.
Schuman Declaration, May 1950.
Simon, Frédéric; 'EU's Sefcovic: Real risk that 'raw materials become the new oil', EURACTIV, 20 November, 2018, link here.
Small, Andrew; 'The meaning of systemic rivalry: Europe and China beyond the pandemic', European Council on Foreign Relations, May 2020, link here.
Tagliapietra, Simone; Zachmann, Georg; Edenhofer, Ottmar; Glachant, Jean-Michel; Linares, Pedro; Loeschel, Andreas; 'The European Union Energy Transition: Key Priorities for the Next Five Years', Bruegel, Policy Brief, July 2019, link here.
Tvaronavičienė, Manuela; Ślusarczyk, Beata; 'Energy Transformation Towards Sustainability', Elsevier, 2019, link here.
Twidale, Susanna, 'Explainer: Why Russia drives European gas prices', Reuters, 24 February 2022, link here.
U.S. Geological Survey, 'Mineral commodity summaries 2021', 2020, link here.
United Nations (UN), 'For a livable climate: Net-zero commitments must be backed by credible action', Climate Action, October 2021, link here.
United Nations Intergovernmental Panel on Climate Change (IPCC), 'Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty', World Meteorological Organization, Geneva, link here.
Usman, Zainab; Abimbola, Olumide; Ituen, Imeh; 'What Does the European Green Deal Mean for Africa?', Carnegie Endowment for International Peace, 2021, link here.
Vakulchuka, Roman; Overland, Indra; Scholten, Daniel; 'Renewable energy and geopolitics: A review', Renewable and Sustainable Energy Review, no. 122, January 2020, link here.
Wilson, Jeffrey D.; 'Whatever happened to the rare earths weapon? Critical materials and international security in Asia', Volume 14, Issue 3, pp. 358-373, link here.

Interviews

Interview with Colonel Chief of Staff in reserve/Security and Geopolitics Analyst, Bruges, 12 April 2020.
Interview with Commission official from the Directorate-General for Energy (DG ENER), Bruges, 20 April 2020.

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