

BAJO LA LUPA

ENERGY EFFECTS OF THE RUSSIA-UKRAINE WAR

RUSSIAN INVASION IN UKRAINE

On February 24, Russia invaded Ukraine and was the beginning of historic political actions and major movements in global markets.

The invasion has generated great volatility and affected mainly the energy sector and agricultural products. The prices of gas, coal, oil and other commodities skyrocketed and triggered major geostrategic movements, and this situation is likely to leave both winners and losers.

The Russian invasion exposed to the world the European continent's energy dependence on Russia and has strained the region's security of supply. The war prompted it to take further steps in its quest to become truly energy independent, but this would force it to leave behind a current relationship that dates back more than 60 years of dependence on Russia.

Natural gas prices in Europe
Dutch TTF, Euros per MWh



Oil price
Cost of ICE Brent crude oil in dollars



Coal price
ARA ICE. Dollars per ton



RUSSIA'S IMPACT AS AN ENERGY SUPPLIER

Russia is the world's third largest oil producer after the United States and Saudi Arabia. It is also the world's second largest gas producer.

Russia's gas exports accounted for **19% of the world total in 2020**, oil exports accounted for **12%** and derivatives for **10%** of the world total in the same year. Together they account for 40% of Russian state revenues.

		PRODUCER	EXPORTER
	Oil	3rd	1st
	Gas	2nd	1st
	Coal	6th	3rd
	Gold	3rd	

Russia - Europe

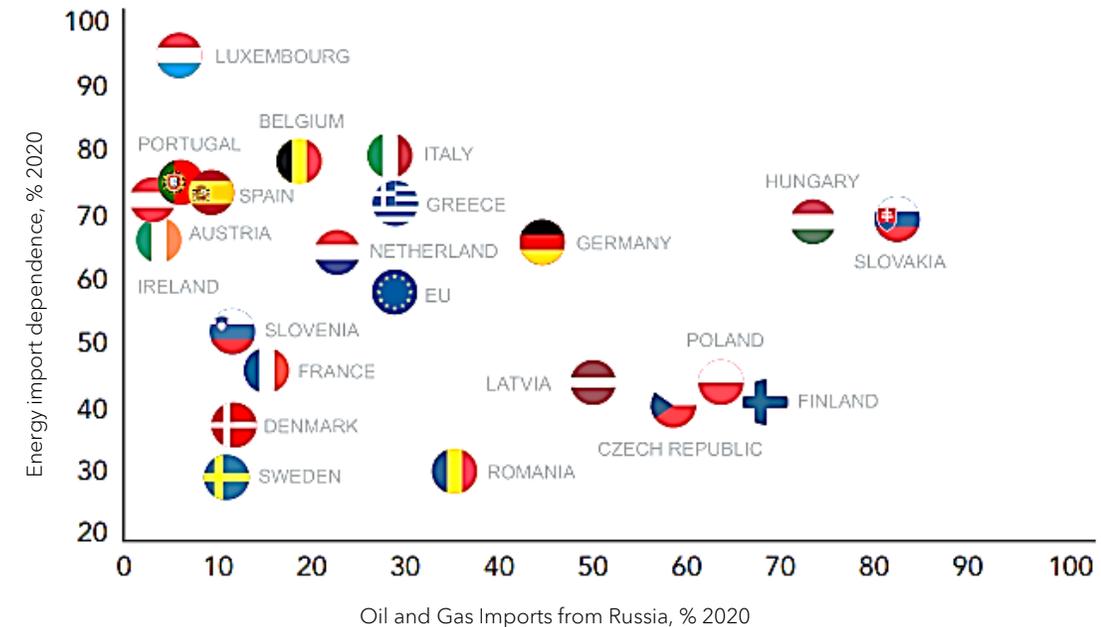
Russia sells **78%** of its total gas exports and **53%** of its oil exports to Europe.

37% of the gas used in Europe is imported from Russia. 91% of this gas arrived in 2020 through pipelines¹, and 9% in the form of liquefied natural gas (LNG). This difference lies in the fact that there are several major pipelines linking gas fields in Russia to Europe, and several of them pass through Ukraine.

The existence of these pipelines has meant that many European countries do not have the infrastructure to receive large quantities of LNG at their regasification plants, and this is a problem, as LNG would be a quick escape from the current dependence on Russia.

3.8% of Ukraine's GDP comes from what it charges Russia for the transit of gas to Europe²

Dependence on Russian energy imports in Europe



Source: Eurostat

¹, A Gas pipeline consists of large overland pipelines used to transport gas on a large scale..

², Source: Diario AS

GAS - THE EPICENTER OF THE ENERGY CRISIS

Russia is the second largest gas producer in the world behind only the United States, but by far the largest supplier to Europe. Most of that energy is transported through pipelines that pass-through Ukraine and Russia has the power to open or close the tap that manages the energy.

Gas pipelines from Russia

- Belarusian Corridor:** Gas pipeline in the Yemel peninsula that runs 4,196km from Russia to Holland. It has one of the largest reserves and is one of the most important in Europe.
- Ukrainian Corridor:** It is made up of the Soyuz and Brotherhood pipelines, and starts in Russia, passes through Ukraine and ends in Europe. It is the one that supplies the most gas to Eastern European countries.
- Baltic Corridor:** It is made up of Nord Stream 1 and Nord Stream 2. Together these two pipelines could deliver more than a quarter of all the gas consumed annually by the European Union. It is the only one that does not pass-through Ukraine. Nord Stream 2 has not yet operated, and on February 22 this year Berlin confirmed that it will not certify it because it is controlled by Russia's Gazprom.

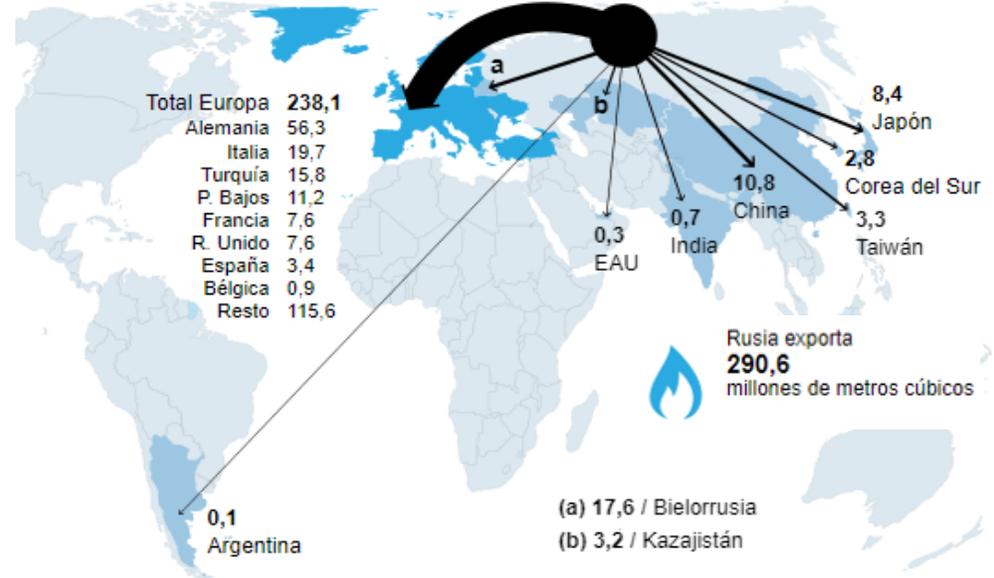
European Dependence

For several European countries, Russian gas supplies are essential. In Germany, it accounts for 55% of its gas imports; in Italy 39%, in the Czech Republic 100%, Latvia 100%, Belarus 100%, Hungary 95% and Poland 55%.

Germany's situation is one of the most complicated in the bloc. They believe that dependence on Russian gas could only be ended in 2024, and that, if the gas pipeline taps were turned off now, it would lose around 220 billion euros in economic output and would fall into a deep recession³.

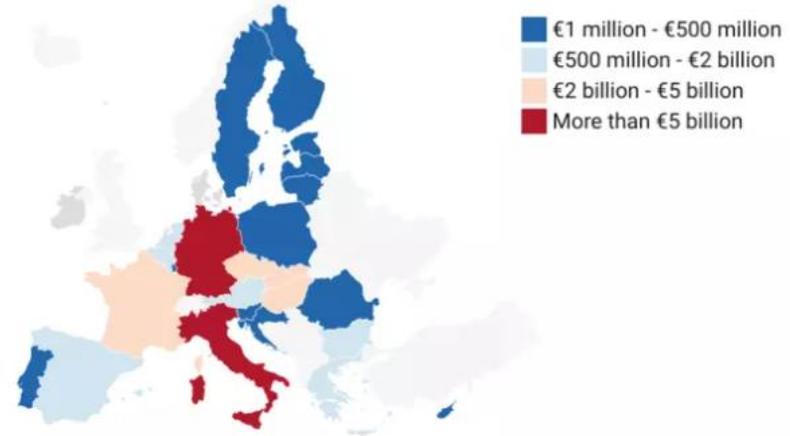
3. Source: World Economic Forum

World dependence on Russian gas



Source: Statistical Review of World Energy 2021; ABC

Annual expenditure on Russian gas by members of the European Union



Source: www.worldeconomicforum.org

ALTERNATIVES TO RUSSIAN GAS FOR EUROPE

An alternative source of natural gas would be the **importation of liquefied natural gas (LNG)**, although this may entail infrastructure and supply problems. LNG is natural gas cooled to -160°C. Thanks to this temperature it is in a liquid state, and when liquefied, its volume is reduced 600 times. Being liquid allows it to be stored and transported to faraway markets, beyond what is technically and economically possible with a gas pipeline. It is transported in methane tankers with refrigerated facilities to keep it liquid.

The current suppliers of LNG to Europe are the United States (28%), Qatar (20%), Russia (20%), Nigeria (14%) and Algeria (11%). **Europe's LNG import capacity of 157 billion cubic meters per year is only sufficient to provide 40% of total demand**, so the remaining 60% still has to be supplied with natural gas.

Main exporter options for Europe

U.S. energy companies are increasing LNG export capacity by nearly 20%, to 13.9 billion cubic feet per day by the end of the year. But if Russia turns off the taps, the new supply may not be enough to rescue Europe.

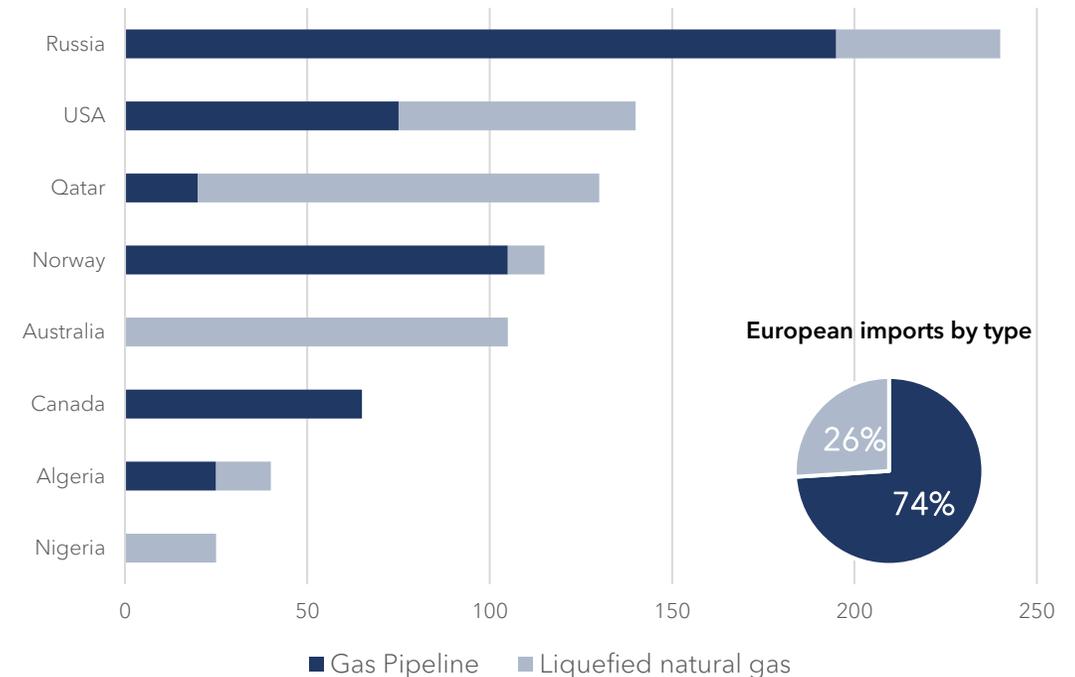
Russia as an exporter of LNG

Russia had planned to expand its LNG exports over the next decade, but this seems unlikely in light of the current environment, putting additional pressure on global supplies.

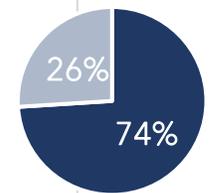
It produces about 8% of the world's LNG and had announced plans to expand this to 15% by 2030, which now seems very ambitious given the sanctions imposed.

Main Natural Gas exporting countries by type

In billions of cubic meters



European imports by type



MAIN CHALLENGES FOR THE GNL ALTERNATIVE

In addition to Russia, Norway and Algeria also export significant volumes of gas through pipelines to Europe, but these countries do not have much additional production capacity. Therefore, the EU is instead looking for suppliers of liquefied natural gas, which can arrive by ship from all over the world.

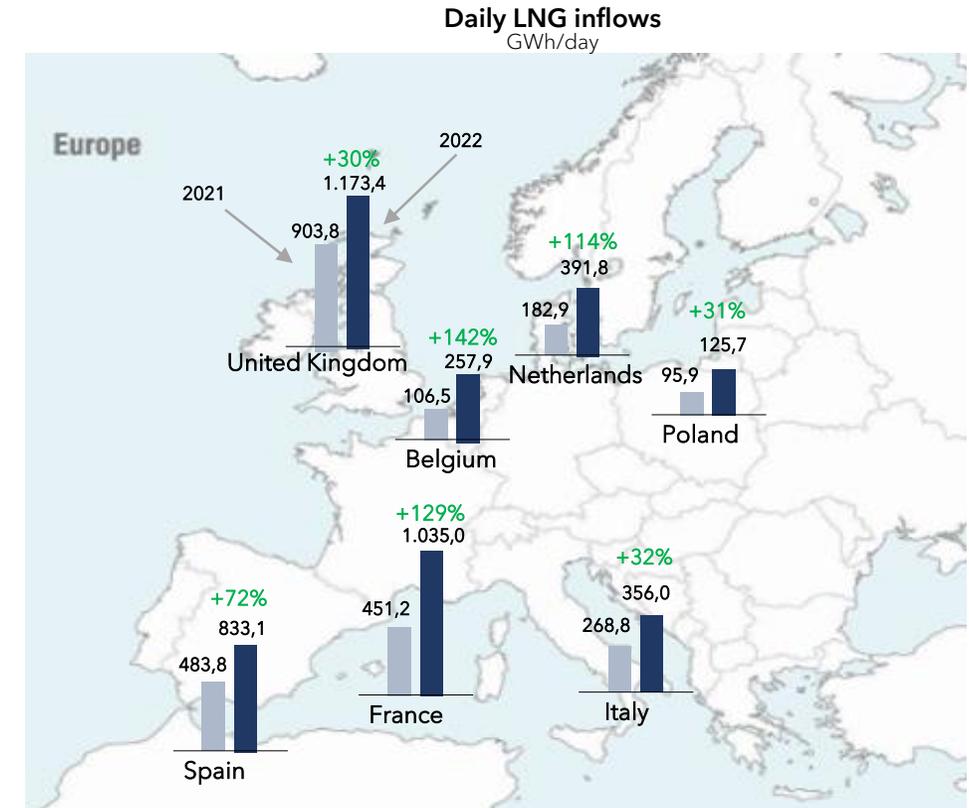
While Europe has had a substantial increase in LNG imports, in the short term it would not be able to fully offset pipeline imports of natural gas.

The spare capacity to export in the short term of the world's major LNG suppliers excluding Russia is not sufficient to cover European supply.

In turn, one of the main challenges for LNG in Europe is that it does not have the necessary infrastructure to store the amount it would need to supply its demand. In addition, the distribution infrastructure to end users is not designed for a significant shift to this type of alternative.

On the other hand, decreasing energy dependence on Russia, but becoming dependent on the US would not be a good choice, therefore, it is necessary to diversify and look for other alternatives to Russian gas as well.

LNG production in the USA has an environmental impact almost double that of gas production in Russia because the technique used is "fracking"⁴. This technique is particularly harmful, and its transportation emits even more CO₂.



Source: Statistical Review of World Energy 2021; ABC

4. Fracking involves drilling into the earth and directing a mixture of water, sand and chemicals at high pressure into a layer of rock to release gas from within it.

OIL - A ROLLER COASTER RIDE

As the crisis deepens, Europe's energy security will represent a key risk to markets. The threat or reality of a supply disruption in hydrocarbon flows will drive prices higher. World energy markets are already tight, making substitution extremely difficult in the short to medium term.

Russia is the world's third largest oil producer and shutting out such a major player would put a severe strain on demand from other suppliers. For the time being, Russian oil continues to be exported thanks to pre-invasion agreements, but European Union countries are currently negotiating an embargo on Russian oil.

The United States could be a new possible winner, since in the last decade they have doubled oil extraction with the implementation of the "fracking" technique and, therefore, leads the ranking of producers.

OPEC countries have increased their production slightly, which, together with the increase in demand, has led to higher prices. Only Saudi Arabia and the United Arab Emirates would have the capacity to replace Russian fluid in the short term, but they show no willingness to take advantage of this possibility.

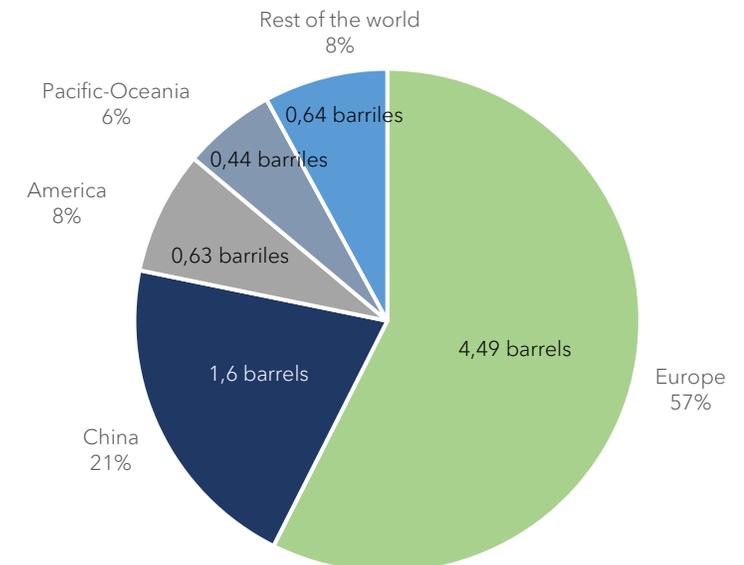
Five largest oil producers in the world
Oil and other liquids production. Data for the third quarter of 2021, in millions of barrels per day.



Source: elmundo.es

Destination of Russian oil exports
Data as of November 2021, million barrels per day

7.8 million barrels per day shipped out from Russia



Source: elmundo.es

THE OPPORTUNITY OF RENEWABLE ENERGIES

The approach towards renewable energies has so far been only from an environmental point of view for the European Union, but now the energy transformation is seen as a great solution to the problem of dependence on Russian gas. Removing dependence on hydrocarbons is a challenge in terms of infrastructure, but the solution lies mostly in electrification.

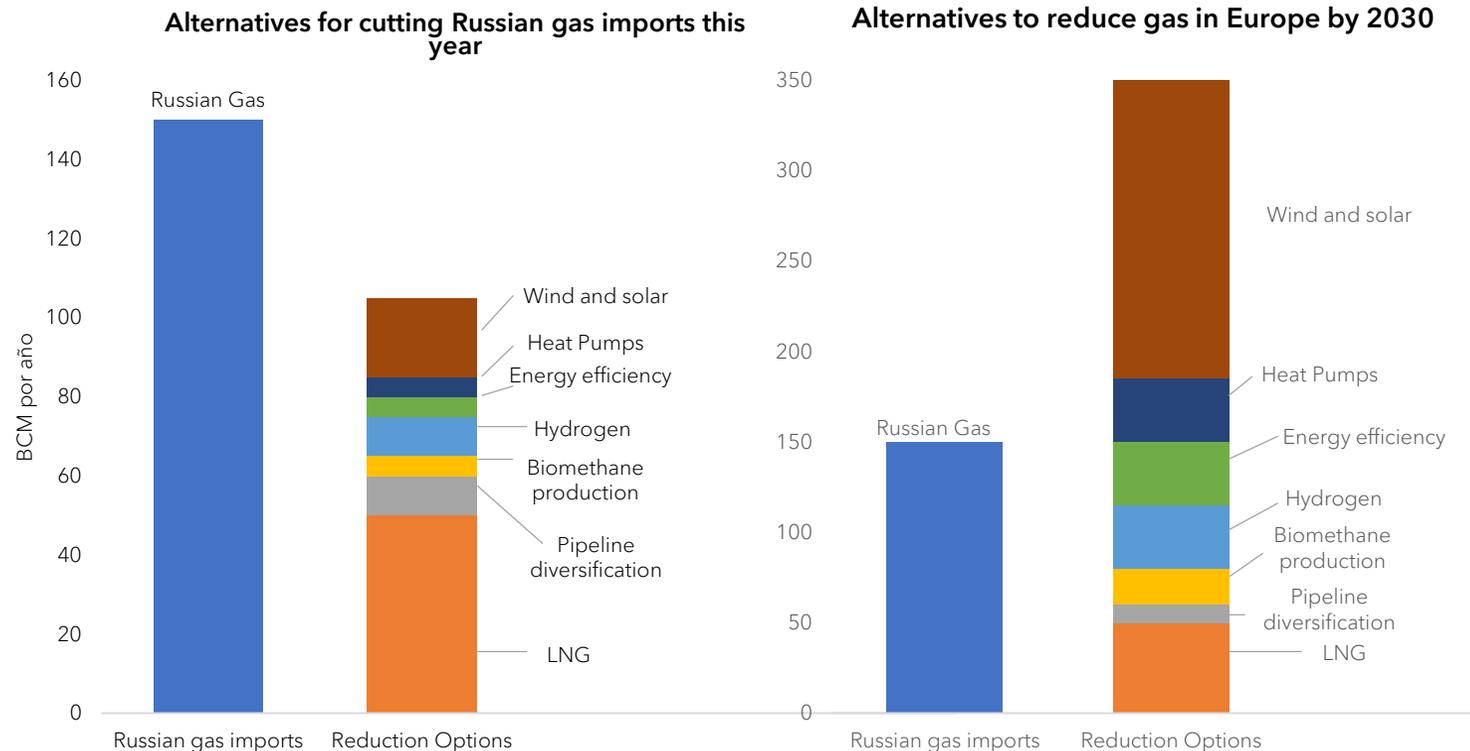
To manifest this energy transformation, which has now become more necessary and urgent, the European Union is trying to boost its clean energies with large developments of solar and wind farms on land and sea. This has sparked a battle to attract financing and to control the resources needed for their development.

China could be a major beneficiary in the increased use of solar energy, as it has the largest solar energy production capacity in the world and, in turn, is the country with the most solar panel manufacturing companies.

Challenge for renewable energies

To store and transport the energy that can be obtained from natural resources, several critical materials are needed to manufacture circuits and batteries, among others.

Most of these materials are minerals, such as copper, cobalt or lithium. These are all located in foreign countries, so this energy transition can transform geopolitical balances, but it will not eliminate European foreign dependence.



THE OPPORTUNITY OF RENEWABLE ENERGIES

According to projections by the International Energy Agency (IEA), by 2050 liquid fuels will continue to be the world's main source of energy, but renewables will catch up and take over from natural gas and coal.

The path to clean energy production will **impact the minerals market**, and it is estimated that, over the next few years, **demand for many minerals will increase by almost 500%.**

Graphite, lithium and cobalt will be by far the most in-demand minerals by 2050 for their ability to store energy.

Where are we going?

The reordering of the world energy map is in process and many movements are still to be seen. On this road ahead, several questions may arise:

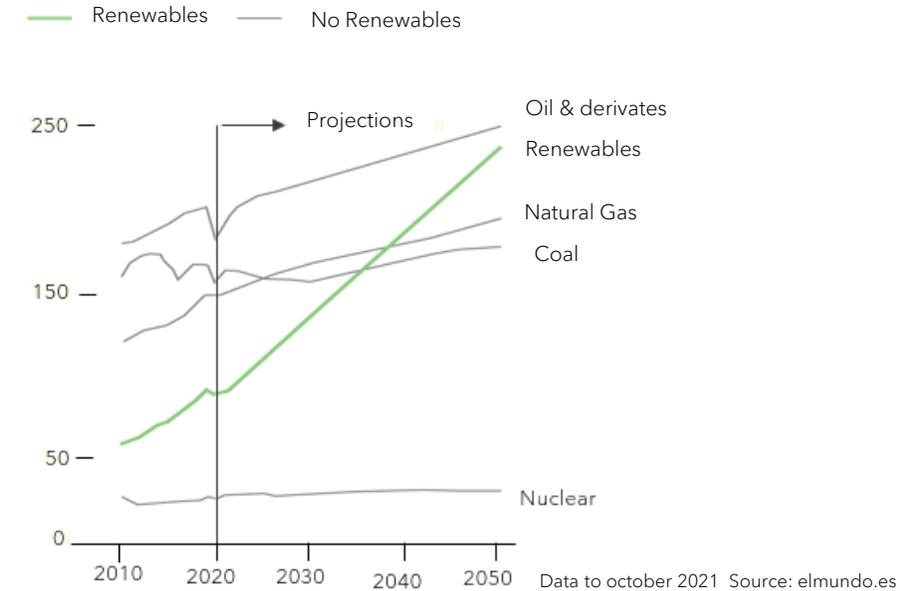
Will Europe be able to completely ban Russian energy supplies? Will Putin turn off the gas tap?

What will be the final weight of the United States in the new order, and that of China?

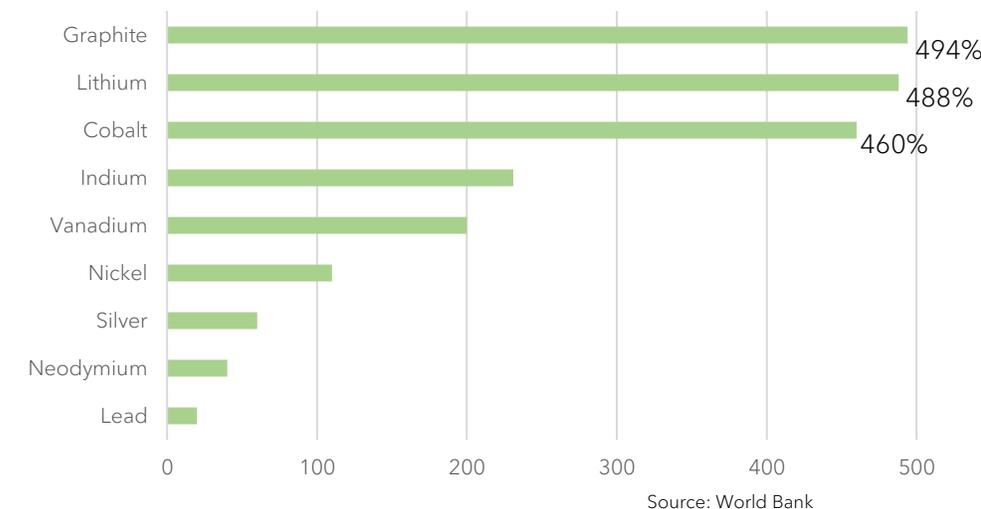
What role will nuclear energy play?

It is clear that the changes taking place are already leaving major short-term beneficiaries, mainly the energy-producing countries, which are getting richer at the expense of those most dependent on foreign supplies.

Consumption by type of energy source in the world
Quadrillion BTU (British Thermal Unit)



Increased demand for mineral production for power generation.
From 2018 to 2050. Data in percent



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