

How will the Russian Invasion of Ukraine affect the energy security and sustainability of Europe?

The Russian invasion of Ukraine has raised concerns about Europe's energy security, and its future sustainability. To explain how this will affect these topics, it is first necessary to understand what energy security is, and how it can be maintained following the loss of Russian oil and gas in the European energy market.

What is energy security?

Energy security is the the “uninterrupted availability of energy sources at an affordable price”, according to the IAE (International Energy Association). This is important, as low energy security can have a knock-on effect on the economy, as, due to high energy prices, it increases the costs of transport, manufacturing and can lead to recession, high living costs, and inflation in countries which are dependent on energy imports. On the other hand, an energy exporter, such as the US, Saudi Arabia or Russia, has a huge advantage in this regard, as it can therefore not only produce enough energy to satisfy it's own needs, but also those of foreign countries.

There are 3 main ways to improve energy security. They include substituting a missing energy source with a different supplier of the same resource, using a different energy resource (such as US LNG to replace pipeline gas from Russia), or reducing demand for energy to match the reduced supply. As we shall see later, all 3 have their pros and cons.

How does the Ukraine war affect energy security?

Following the Ukraine invasion, the countries of Europe started to sanction Russia economically, to weaken it, punish it for the war, and put pressure on Russia to end the war. These sanctions impact energy security in 2 ways: firstly, the EU is trying to reduce dependency on Russian gas, and stop buying it. This would have a huge effect on Russia, as over 74% of Russia's energy exports go to Europe, and the energy sector accounts for 25% of Russia's GDP, according to data from 2020¹. Also, it is being phased out because many European countries and companies refuse to do business with Russia in Roubles, which would shore up Russia's economy, attract criticism, and help them to fund the Ukraine war. At the same time, the loss of oil and gas revenue for Russia would increase political pressure to end the war.

Also, it removes a substantial political tool that Russia can use to control European politics. Historically, Russia has been able to control European politics through the threat of “turning off the tap” and cutting supplies to countries which disagree with Putin. The EU gets 40% of its energy from Russian gas, which means that were supply to be reduced, the energy security of Europe would be compromised vastly, and the economic impact would be vast. Therefore, many European nations attempted to maintain stable relations with Russia, to ensure that such a thing would not happen. By abandoning Russian gas, the EU can make its own political decisions, and ensure that the Kremlin will not cut them off for sanctioning Russia and giving aid to Ukraine, increasing the long term energy security of Europe.

What solutions does Europe have to decrease dependence on Russian gas?

As discussed at the top, Europe has 3 main ways now to reduce dependency on Russia, some of which are suitable in the short-term, and others which can be used to ensure long-term energy security. Some of these methods are also suitable for different uses and offer differing levels of sustainability.

Firstly, it can reduce energy consumption to match reduced supply, by insulating houses, driving less, encouraging heat pumps as opposed to gas boilers, and turning

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down thermostats. This is important, as heating is a major use of Russian natural gas. This is cheap and can be done reasonably quickly compared to, to building new LNG terminals to supply natural gas, or building all-new power stations which may use, say, solar or nuclear energy. For example, wall insulation can save 15% on energy used for heating (which consumes up to 75% of all domestic energy), and making it mandatory would be a useful step in decreasing energy usage. This is cheap and can be done reasonably quickly; however, it does not solve the problem of reduced energy supply. x Driving petrol and diesel cars less can also be used to reduce oil consumption.

The next option Europe has is to use LNG from America or the Middle east, or natural gas from the North Sea. This is useful as it allows the use of already existing natural gas infrastructure, such as power stations, meaning that in the short term, it can be cheaper and quicker than using alternate energy sources, such as wind, hydroelectricity, solar or nuclear power, which require time and money to construct and develop. It also has the advantage of being capable of generating both baseline (constant, uninterrupted electricity) and peak energy (which can be rapidly activated to meet peak demand), which some sources, such as wind and solar, cannot do as they are restricted by the weather conditions, and can be built anywhere, unlike hydroelectricity, which is only applicable in mountainous regions, or in estuaries.

However, due to the long-term environmental impacts of burning carbon-based fuels, which produce greenhouse gases (such as CO₂), leading to global warming, this is not sustainable. In the long run alternatives must be found where possible. One way of doing this is through nuclear power, which the UK has set a 24 gigawatt target for.

This has the key advantage that unlike most carbon-free sources of energy, such as wind and solar, which are weather dependent, can produce a constant supply of electricity, for a relatively low running cost, and without the land usage of dams, solar power stations, or wind farms. However, this is politically hard to sell, due to the bad image of it in the public eye due to the threat of reactor meltdown and contamination, and is expensive and time-consuming to set up, making it not suitable as a short-term fix.

The next option is wind power (50GW target), and solar power. Wind has several advantages: it is carbon-free, does not pollute or contaminate, and can be built relatively quickly. However, it does not produce a constant energy supply, meaning it cannot be used as baseline, and takes up large amounts of space next to a similar output from a different type of power station. Solar has similar problems: it is dependent on clear skies and warm temperatures, which although make it suitable for some countries, make it unsuitable for much of northern Europe.

The main problem with all of these is that none of them can be used for peak electricity, as they cannot be turned on or off on command. Hydroelectricity, where water is pumped up into a reservoir, and when drained, spins turbines in a dam, can be used for this, but this type of hydroelectricity requires mountainous terrain, which makes it only viable for some countries, such as Switzerland, parts of Italy, France and Germany, Hungary, Austria Croatia and the Balkans. Natural gas will, in all probability, still need to be used for this purpose in flatter countries, however, there are ways of sustainably producing it, as it is a by-product of many human processes.

The most effective solution to the energy security question, in my view, is a combination of these methods: in the short term, a push to install insulation, heat pumps and reduce driving could be done to reduce energy consumption, and LNG infrastructure could soon after be installed to supply gas and oil to currently existing power plants. Then, to replace these, wind and solar could be used alongside nuclear baseline power, along with LNG, biogas and hydroelectricity where applicable to generate peak electricity.

Conclusion:

In conclusion, the Russian invasion of Ukraine and the subsequent sanctions do pose a threat to Europe's energy security. However, through methods such as reducing consumption, and increasing LNG capacity in the short- term, and later switching to alternate energy resources, the impacts of the invasion on energy security can be reduced and managed.