What will Russia's Invasion of Ukraine mean for Energy Security and Sustainable Futures?

By Arjun Obitz, 9RA

On Thursday 24th of February 2022, Russia invaded Ukraine, making headlines all over the world. Other countries, the public and many companies have reacted sharply, triggering a wave of reactions and consequences for both Russia and abroad. I am going to discuss the consequences on energy security and sustainability of the invasion.

Effects of the Russian Invasion of Ukraine

Sanctions on Russia

One of the main ways countries have reacted is through sanctions. For example, many countries have banned or reduced Russian energy imports. On the 8th of March, the European Commission announced REPowerEU, a project to cut dependency on Russian fossil fuels by 2030. Likewise, many countries wish to cut imports on Russian gas and oil themselves, such as the USA and UK also plan to wean themselves of Russia for these fuels.

Public Pressure on Energy producers

Furthermore, there's been growing pressure from consumers for energy suppliers and oil companies to end usage of Russian oil and gas. Shell faced heavy criticism for buying discounted Russian crude oil and had to apologise, promising to stop buying Russian Oil. Likewise, BP withdrew from Russia and sold its shares in Rosneft as well as stopping to buy Russian Oil.

The Problem

The problem, however, is that although many wish to stop buying Russian Oil and Gas, this is very difficult due to Russia's major role in European energy markets and energy security.

Russia's role in European Energy Security

What is energy security?

Energy Security can be defined as the uninterrupted availability of energy resources, such as electricity, oil, or gas. The countries with the highest energy security are energy producers, which export energy. These can provide enough energy for their own uses and are not dependent on energy supplied from other countries.

On the other hand, importers of energy such as the EU are less energy secure, as if countries stop selling energy, they will not have any at all to use.

European Dependence on Russian Gas/Oil and Energy Security

In general, Europe is very dependent on Russia for its energy needs, especially with regards to gas. 74% of Russian gas goes to Europe, and many countries, such as Germany depend heavily on it. For example, Germany is 58.9% dependent, Bulgaria 72.8% dependent, Finland is 92.4% dependent and Hungary is a whole 110.4% dependent, importing more than it needs[1]. This reduces European energy security,

[1] Eurostat, https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220328-2

because Russia can turn off the pipelines when and if it sees fit, which becomes more of a risk as relations between Europe and Russia deteriorate.

In order to increase energy security, there are 3 options available: reduce demand by increasing energy efficiency, finding alternative forms of energy, such as coal, renewables or nuclear and finding an alternative supplier, such as American or Arabian LNG.

Effects of Reducing European Energy Dependence on Sustainability

Sustainability of Replacing Russian Gas

However, one problem with replacing gas is due to the consequences on long-term environmental sustainability, as many alternatives risk increasing emissions of Greenhouse gases.

Methane vs Oil and Coal

The chemical structure of Natural as is mainly methane (CH_4). When this burns, it reacts with oxygen forming Carbon Dioxide and water:

$CH_4+2O_2->CO_2+2H_2O$

On the other hand, when coal or oil burn, they release far more CO_2 for the same energy, meaning they have a greater effect on Climate change. Most of the emissions of Methane burning is water, which while a potent greenhouse gas, does not linger in the atmosphere. This would make a switch to Petrol or Coal power undesirable in the long term.

LNG

Another alternative fuel to piped gas is LNG. Methane is naturally produced during oil production as a byproduct, as they are often found together. Normally, this is burned of in a process called flaring, but an alternative would be to condense it into LNG, which can be shipped and burned for energy production. This does not release any more CO_2 than flaring and is a way of using gas which would be wasted otherwise. Already, America, Australia and Qatar have invested heavily in LNG and many European countries, such as Lithuania have built LNG terminals to receive it.

Renewables

From a sustainability standpoint, renewables and nuclear power are the most desirable forms of electricity generation. They do not release CO_2, and both have low running costs. However, both are problematic in many ways, which I will discuss in the conclusion.

Solutions: How should Europe respond to the War while protecting Sustainability and Energy Security

Despite the challenges of maintaining energy security while ensuring a sustainable future, there are solutions in both short- and long-term timescales to doing so for Britain and Europe. This section is my outline of potential solutions for this problem, which fall under the 3 ways of increasing energy security I discussed earlier.

Reducing Energy Demand

One of the most immediate ways countries in Europe could increase their energy security is by reducing demand for energy. For example, high energy prices could simply make people reduce the thermostat by 1 or 2 degrees Celsius, reducing energy use per capita for heating, which is one of the main uses of Russian Gas. This could be

done almost immediately, as it requires only a very minor lifestyle change. Raising heating may encourage this, as people wouldn't desire to pay excessively for heating.

Another heating-related fix would be improving insulation standards in housing. Many houses are poorly insulated, resulting in wasted energy. This will take a bit longer than reducing the thermostat but can be implemented in merely a few years.

Another easily implementable change would be to reduce fuel consumption through cars, which would reduce energy demand. This would involve encouraging people to drive less in the short-term while encouraging EV sales and increasing fuel economy regulations in the long-term.

Finding Alternative Energy Suppliers and Energy Forms

To reduce use of Russian gas, countries can build LNG ports, which can be used to import American or Arabian LNG. Other potential alternatives include the Southern gas corridor, which stretches to Azerbaijan. This would allow Europe to replace Russian Gas, while still meeting demand. Furthermore, it can reuse current gas powerplants.

However, in the long term, investment in expanding other forms of energy production, especially renewables would be desired. However, these are problematic, especially when you factor in geography and climate.

Wind and solar energy are cheap to set up but are hampered by poor reliability. As a solar panel needs sun to produce energy, and wind turbines need wind, both cannot produce 24-hour power. Nuclear power is cheap to run but expensive to set up. It also cannot be deactivated easily. Furthermore, it is marred by fears about safety and the ecological consequences of nuclear waste disposal. Finally, hydroelectricity is not effective for all countries, especially the UK as it needs mountains to be effective. Also, it requires flooding land and displacing people.

However, a combination of these with other technology can be effective. The two solutions which I view as desirable are in the short term, using as turbines, which can be turned on and off when needed, to supplement wind turbines and solar panels. This would involve the construction of infrastructure to import American LNG, making Russian fossil fuels redundant. Alternatively, the gas turbines could be replaced by a battery which stores excess electricity made by wind turbines and solar panels and releases it when needed.

Conclusion

In conclusion, while the invasion of Ukraine will reduce energy security, as it means Russia may feel inclined to cut energy supply to Europe, in the long-term this can be fixed by reducing energy demand and replacing Russia's role in the energy market.