The Journal of International Relations, Peace Studies, and Development

Volume 8
Issue 1 *The Journal of International Relations, Peace Studies, and Development*

Article 5

Bring On The Heat

Renée Stoute

The Journal of International Relations, Peace and Development Studies
A publication by Arcadia University and the American Graduate School in Paris

Bring On The Heat

*Renée Stoute

Introduction

According to the World Economic Forum, in retaliation to European Union sanctions and embargoes, Russia cut EU gas flows by around 80% between May and October 2022 (WEF, 2022). The EU, in turn, has had to not only reduce energy consumption within the public and private sectors but has also scrambled to find energy alternatives to compensate for its energy shortcomings. However, due to the EU's rejection of Russian oil and gas, there are now opportunities to embrace more sustainable energy alternatives quicker than previously expected. This could lead to a faster transition towards the use of cleaner and more sustainable renewable energies and promote the development of green technologies, and a hope that potential climate goals can be achieved. How has the green transition in the EU accelerated since the start of the Russian war in Ukraine? The IPCC report states:

> "Policies and laws addressing mitigation have consistently expanded… Global greenhouse gas emissions in 2030 implied by nationally determined contributions announced by October 2021 make it *likely* that warming will exceed 1.5°C during the 21st century and make it harder to limit warming below 2°C" (IPCC, 2023, p. 10).

Yet, despite the eagerness for rapid acceleration in the global energy transition, it may still not be enough to account for the high levels of global warming and climate change, predicted by the IEA. Therefore, the EU must engage in more established actions to accommodate for global emissions that are currently emitted and will be emitted in the future. This paper seeks to find how the EU is planning to embrace renewable energy sources and what is being done to ensure it is as efficient and sustainable as possible as the war in Ukraine continues and even after it has ended. It is an attempt to not only demystify the impact the Russian war in Ukraine has on the future of green energy and the necessary transition in the EU but also open dialogue on the possibility of remaining in line with recommendations of 1.5°C and ambitious emission reduction policies that will have an actual impact on climate goals set out by the UN. This is crucial, especially as the brunt of new energy policies developed in reaction to the invasion has fallen on consumers and EU member states, who in turn may push back against climate and clean energy policies. How can the EU embrace renewable energies and pursue more monumental emission reduction-cutting policies to meet net-zero goals set out by its own lawmakers and the United Nations?

The Economist estimates that based on a range of factors including, fossil fuel consumption, energy efficiency, and deployment of renewables the war in Ukraine may have fast-tracked the global green transition by as much as 10 years.
The 2023 IPCC report states that

> "Human activities, principally through emissions of greenhouse gasses, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in

> 2011-2022. Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals" (IPCC, 2023, p.4)

The report continues,

> "Rapid and far-reaching transitions across all sectors and systems are necessary to achieve deep and sustained emissions reductions and secure a liveable and sustainable future for all" (IPCC, 2023, p. 30)

This essay will focus primarily on the EU as it is one of the key leaders in the international community for enacting green policies and working to transition to renewable technologies. The focus will be on some of the major policies enacted in the EU bloc and transitional efforts among its member states, within different renewable energy sectors, which have occurred since the Russian invasion of Ukraine in February 2022. While many climate and energy targets from EU member states intend to see goals met by 2050, this research will focus primarily on any accelerated goals found in the revised version of the Fit for 55 package or its more energy security focused counterpart, the Repower EU plan, as well as any member state actions with intended success on or before 2030. This allows for a more realistic and tangible analysis of energy transition efforts over the next few years, especially as the war in Ukraine seemingly has no end and the EU must ensure its energy security in the meantime.

How has Russia impacted energy policy

Russia's invasion of Ukraine has taken the global community by surprise in nearly the same way that the COVID-19 pandemic shattered illusions of economic and social stability in the international community. While states around the world, and particularly in the EU, have come to accept just how dependent they have been on Russia for its energy supply needs; they have also begun to grapple with the lack of energy security they face considering the war.

According to the International Energy Agency (IEA), many regions globally have experienced a dramatic increase in energy prices, which have hit consumers the hardest due in part to the COVID-19 pandemic's effect on global supply chains and an increase in inflation. Coupled with the realization of just how dependent on imported fossil fuels many nations are; high energy consumption, energy price increases, and resource instability has pushed many states and regions to accelerate their green transition and are hoping to use the war in Ukraine as an opportunity to assert their own independence, particularly when it comes to energy needs.

Energy security, as defined by the IEA, is the uninterrupted availability of energy sources at an affordable price (IEA, 2023). It is the link between the availability of natural resources, renewable or nonrenewable, for energy consumption and national security. States often use different energy mixes to establish their security which can benefit their economic growth, political stability, and development (Guevara, 2022). A country usually develops short term and long-term policies to protect itself from internal and external threats, including investing in energy needs that align with current and future economic needs and reacting appropriately to supply and demand.

Through globalization, states have had to grapple with the uneven distribution of resources leading to instability and vulnerability within its borders, especially as developing nations experience rapid growth in economic needs, population, industrialization, or adapting to and mitigating against major climate change events (Farah et. al, 2011). Globally, the majority of the world still relies heavily on oil and petroleum products for transportation, energy, manufacturing, agriculture and food production, and other needs which leads to reliance on oil-producing countries to meet their demands. These countries are able to set oil prices, withhold oil supply, or completely stop sales to specific countries, regions, or blocs. It is essential for states to develop a solid energy security plan in order to remain resilient as the security of energy resources becomes more challenging, this is especially true in light of Russia's attack on Ukraine. By embracing renewable energies, reducing energy consumption, and diversifying technologies a state can ensure it remains secure energy wise and will be able to recover quickly in the event of another attack. This is especially true for the United States, which has had energy dependence at the forefront of its policy issues for decades, now after the Russian invasion, finds itself as the world's top energy exporting nation with most of its supply going to Europe. In February 2023 it averaged about 10 million barrels per day compared to 7.6 million a year ago (Domm, 2023).

Russia before the war and even today remains the third largest crude oil producer and 2nd largest producer of natural gas in the world, with the United States and Saudi Arabia taking first and second place. Russia relies heavily on exporting oil and natural gas which made up 45 percent of its federal budget in 2021 (IEA, 2022) thanks to large oil and gas fields located in the Arctic Circle. It is estimated that in 2021, Russia produced 540 million tons of crude oil, providing 13 percent of global production (Heussaff et al., 2023) and about 10% of the global supply of oil (The New York Times, 2022).

Despite imposed sanctions in response to the invasion, Russia has been able to keep up its oil output and export levels to pre-war levels, in part because of remaining dependency and by rerouting most of its supply to Asia, Africa, and the Middle East (IEA, 2023). Sanctions imposed by the West have only had an impact on the EU market and revenue, with Russian oil exports totaling 7.5 million barrels per day in February 2023, down only 500, 000 barrels from the previous month (IEA, 2023). In turn, India and China now account for over 70 percent of Russia's crude exports in February 2023.

In EU

EU dependence on fossil fuels

Despite being leaders in global climate and energy action, the EU and Europe as a whole still use fossil fuels as their main form of energy consumption, especially in the form of gas, with it being the largest importer of natural gas in the world. ⅓ of the energy generated for electricity came from gas in 2021 (Statistical Review of World Energy - BP, 2022, Haddad, 2022). The EU has largely been dependent on Russian fossil fuels to meet this demand with an estimated 45.3 percent of gas imports flowing through Russian pipelines in 2021 (European Commission, 2022, Kuzemko, 2023) and increasing to 50 percent at the beginning of the war in February 2022. Russian retaliatory efforts such as cutting off Poland and Bulgaria's access to its natural gas supply via Gazprom and cutting off gas supplies to Germany via the Nord Stream 1 pipeline to throttle European natural gas markets have not been successful. Thanks to a mild winter and reduced demand for liquid natural gas in China, EU

energy security has been successful by chance rather than policies. While Russian imports to the EU have stopped, exports from other countries have increased to fill the gap in order to secure gas and oil supplies. The United States has increased shipments of liquified natural gas (LNG) becoming the world's largest LNG exporter in one year, with an increase of 150 percent from 2021 levels and providing half of Europe's LNG needs. (EIA, 2022, Eberhard, 2023). Crude oil exports from the US have increased 70 percent thanks to the shale boom over the last 15 years.

EU efforts to reduce reliance

Even before the war, the EU has been battling a cost-of-living crisis and an increase in costs due to high energy prices, especially after the Covid-19 pandemic. The war has now only exacerbated the weak links in the chain of the EU energy market. As a result, member states agreed to phase out dependence on Russian fossil fuels with the Versailles Declaration, signed in March 2022. Since the declaration was drafted, the European Union continues to target Russian imports, as they appear in order to curb war efforts and ensure sanctions and embargoes have more of an impact. In May 2022, the European Council agreed to ban 90 percent of Russian oil and refined petroleum product imports by the end of 2022, excluding crude oil delivered by pipeline. In December 2022 it saw the banning of seaborne crude oil imports and in February 2023 began banning seaborne oil products. While the EU cannot fully cut Russian imports or risk its own energy security it has placed a price cap on Russian crude exports, diesel, fuel oil, and other fossil fuels reducing revenue from 14.3 billion USD to 11.6 billion between February 2022 to January 2023 and 20 billion USD from 2022 to 2023 (Adomaitis, 2023). With sanctions and embargoes from the EU and G7 price caps, Russia loses an estimated 160€ to 280 million euros per day further weakening the Russian economy (CREA, 2022, Liboreiro, 2023).

EU fossil fuel consumption

Since the war began, there has been a focus on whether the EU has increased its fossil fuel consumption, particularly coal, leading to higher C02 levels. This is due to an increase in coal consumption that began in the first half of 2021 as EU energy demand rebounded after the COVID-19 pandemic. Low gas storage levels also allowed Russia to take advantage of European needs in preparation for its invasion. It has seemed that the EU has "returned" to coal as member states have resurrected 26 retired coal plants and extended the retirement date for plants already in commission. Yet, data has shown that emissions and consumption peaked from below pre-COVID levels and have steadily fallen since September 2022 (Myllyvirta, 2023). As prices have increased for fossil fuels a reduction in demand occurred. This reduction can be linked to an increase in hydropower, nuclear power operation normalization, solar, and wind farm development. This increase in clean energy and related policies will only further reduce fossil fuel consumption and emissions in the coming years.

It is estimated that at the beginning of the war, Germany imported more than half its natural gas and ⅓ of its crude oil from Russia after phasing out nuclear and coal power. It became the poster child for the "energy trilemma" or a country's ability to provide environmentally sustainable energy while also accounting for social impact and security (Gilbert et al., 2021). It had hoped to phase out nuclear power by December 2022 and coal by 2030, when the invasion began. However, Germany found itself ensnared in total reliance on Russian energy and EU efforts to punish Russia. In a year, Germany saw its energy consumption reduced by 19 percent, with household and smaller commercial customers using 36 percent less energy than expected (Ruhnau et. al., 2022). This is thanks not only to

high energy costs but also increased consumer attention on the energy crisis. Now, Germany has planned to increase its renewables from 65 to 80 percent by 2030 through onshore and offshore wind and solar PVs. It also plans to implement a carbon tax on buildings that use fossil fuels and then proposes by 2024 to ban oil and gas heating systems in buildings altogether (Kurmayer, 2022).

Italy and the Netherlands have seen similar reductions in reliance on Russian fossil fuels. Gas makes up 42 percent of Italy's energy consumption and 45 percent of its imported gas came directly from Russia (France 24, 2022). Alternatively, The Netherlands does not consume as much gas but has completely stopped importing from Russia, in part because Gazprom suspended sales to GasTerra in May 2022 (Czyżak, 2022). Groningen gas in the Netherlands, which is the largest onshore natural gas field in Europe will stop production by October 2023 after a series of earthquake risks have made it dangerous for operation despite pushback over energy security concerns, a promising action indicating high security in renewables (Szabo, 2023).

EU transition to renewable energies

The Green Deal, launched by the EU in December 2019, hoped to make the EU the first climate-neutral continent by becoming carbon neutral by 2050, decoupling resource use from economic growth, and reducing net greenhouse gas emissions by 55 percent by 2030 compared to 1990 levels.

Pre-war, EU members subsidized renewable energies and began switching from coal or nuclear energy to natural gas, which was seen as relatively cleaner than coal and safer than nuclear power plants. The European Commission has now set its focus on diversifying supplies, utilizing renewables, reducing overall energy demand, and fortifying storage in case of future events. The Green Deal has been adapted and modified in light of the invasion by focusing on the Fit for 55 plan and now focuses on the Repower EU strategy to ensure climate goals are met not only within the EU but on an international level as well.

Fit for 55

The Fit for 55 package is meant to reduce net greenhouse gas emissions by at least 55 percent by 2030 from 1990 levels. It was first proposed by the EU Council and European Parliament in 2021 and fast tracked in June 2022. It intends to provide opportunities for new climate focused initiatives and policies in line with climate focused goals already in place. Its main objectives include ensuring a just and socially fair transition, maintaining and strengthening innovation and competitiveness of EU industry while ensuring a level playing field through third-country economic operators, and underpinning the EU's position as leading the way in the global fight against climate change (European Council, 2023). The plan includes measures to support green transportation, renewable energies, and the Carbon Border Adjustment Mechanism (CBAM) on emissions - a tariff on high carbon imports from countries not working to reduce greenhouse gas emissions. This is an effort to protect EU production and ensure that production is not relocated to non-EU countries with more lax carbon regulations. Overall, the focus of the Fit for 55 plan is to boost the number of renewable energies in the EU and reduce the carbon footprint in the energy sector.

The package has reformed the EU emissions trading system (EU ETS) which is the main tool used to reduce emissions and works in parallel with CBAM. Since its inception in 2005, EU emissions have decreased by 41 percent (European Council, 2023). The EU reached an agreement in December 2022 to increase emission reduction within sectors by 62 percent by 2030. New targets aim to include maritime and aviation sector transport in emissions counting and reduction objectives under the Paris Agreement, reduction of emission allowances, increase for funding for the modernization and innovation funds, and revision of the market stability reserve.

Fit for 55 has also established revised plans to remove C02 from the atmosphere through carbon capture efforts through soil and forests through its land use, land use change, and forestry sector (LULUCF). The new target sets an ambitious goal of 310 million tons of C02 removed by 2030 and each member state is also expected to meet specific adjusted targets each year. Along with LULUCF, there are now obligatory annual greenhouse gas emissions targets for member states in sectors that are not covered under the EU ETS or LULUCF regulations. These sectors include road and domestic maritime transport, buildings, agriculture, waste, and small industries. These new rules intend to increase emissions reduction from 29 to 40 percent compared to 2005 levels. By 2035, new cars and vans are expected to reduce emissions reduction targets by 100%. There is also a push for the rapid deployment of alternative fuel infrastructures such as charging or refueling for vehicles.

Within the energy sector, methane emissions, which are responsible for 19% of EU emissions, are expected to reduce by 30 percent compared to 2020 levels facilitated by the Global Methane Pledge signed by over 100 countries, including the United States. Efforts to shift from natural gas to renewable or low carbon options include adding hydrogen and decarbonized gas to the market. Taxation on energy products and electricity can further encourage the energy transition by placing higher taxes on high-polluting fuels and incentivizing consumers to make more sustainable decisions. The aviation and shipping industry negotiations in April 2023 have ensured that free concessions used by these industries will soon be phased out and use greener and more sustainable fuels which are expected to contribute to emission reductions.

The package also hopes to reduce EU energy consumption as a whole by 11.7 percent by 2030 compared to projects made in 2020. This will include making buildings more energy efficient by transforming existing buildings and erecting new buildings to have zero emissions. Finally, in light of all these climate policies and initiatives the proposed social climate fund, totaling 86.7 billion euros will also work to tackle energy poverty and improve access to zero and low mobility and transport in the EU This will support vulnerable groups that are expected to be the most affected by the high cost of fuel prices as a new green energy system is implemented.

Repower EU strategy

In light of the Russian invasion of Ukraine, the European Commission developed the Repower EU Plan in May 2022. This plan was created to counter the difficulties found within the global energy market and envisions the EU energy mix to consist of 45 percent renewable energy by 2030 across multiple sectors including, heating, transportation, industry, and electricity. Its main focus is to accelerate the clean energy transition away from fossil fuels in Europe while also ensuring European independence from Russia and future unreliable suppliers before 2030. The plan has three major

pillars: saving energy, producing clean energy, and diversifying energy supplies. The Repower EU plan came at a time when EU leaders were already searching for viable opportunities to develop and support European energy needs and infrastructure.

Accelerating clean energy

As the cost of renewable energies has decreased over the last decade. The EU has been able to take full advantage of accelerating its energy transition, remaining a leader in positive climate and environmental action globally. It has begun to look inward at its domestic capabilities to generate renewable technologies and produce its own clean energy in order to reduce dependency, even proposing an increase for renewable targets from 40% to 45% for its 2030 goals. The Repower EU plan has allowed for substantial investments in green and renewable energies to aid in reducing dependency on fossil fuels. This transition requires a massive increase in the replacement of fossil fuel industries, especially within the infrastructure and transportation sectors. By transitioning the demand for clean energy, it will ultimately lower prices over time and decrease foreign imports.

Energy savings

As the EU has been working to transition to independence from Russian fossil fuels, the brunt of costs has at times fallen on consumers. With Russia withholding supplies to EU member states contingency plans have been put in place to aid in the protection of consumers from skyrocketing energy prices through subsidies. While working to reduce costs for consumers, the EU has also enacted a continent wide campaign to reduce energy consumption for all sectors, businesses, and citizens.

Diversifying energy

By diversifying international energy suppliers, the EU has been able to shift its dependence on Russian oil and liquid natural gas (LNG) rapidly in the wake of the invasion. The EU has also been able to shift its focus to long-term goals including diversifying types of energy used to power its member states. By replacing gas, coal, and oil the EU is looking to remain competitive in an ever-growing global market and become a leader in technological capabilities related to clean and green industries.

Renewable electricity and other projects deployed

By June 2022, 19 member states had planned to increase their green transition, in part due to the COVID-19 pandemic and faltering energy security, and geopolitical threats from Russia. Current policies enacted by EU member states could see electricity generated by fossil fuel fall by 31 percent (Czyżak et. al, 2022). By completely eliminating coal and reducing fossil fuel use in the energy sector it is estimated that 82 percent of energy sources will be generated by renewable energy sources by 2030. In 2020, 22.1 percent of the energy consumed came from renewable energies and has remained relatively the same over the last two years. Renewable energy sources, such as wind and solar have generated ⅕ of EU electricity in 2022, overtaking fossil fuels for the first time (Ember, 2023). Investment in low-carbon energy transition technologies rose by 31 percent globally totaling 1.1 trillion USD in 2022 leveling out with fossil fuel supplies (Catsaros, 2023). By 2030, Portugal, the Netherlands, Austria, and Denmark are expected to generate close to all of their electricity from

renewable sources. Italy, Ireland, and Greece have aimed for 70 percent of electricity produced through renewables.

Volatile gasoline prices have led to an increase in electric vehicle use, this despite high electricity prices. Sales of electric vehicles increased by 16 percent in the second quarter of 2022 and with a 70 percent increase from 2021 (IEA, 2022). As of April 2023, there are an estimated 6.1 million electric vehicles in the EU (European Alternative Fuels Observatory, 2023). Electric vehicle fleets need to increase to 30 million under both the Fit for 55 package and the Repower EU plan, with future estimates forecasted between 40-84 million electric vehicles by 2030 potentially exceeding expectations. The sale of combustion engine cars and vans is set to end by 2035 and car manufacturers are expected to reduce the C02 emissions of new vehicles by 2030.

Wind

The Repower EU plan aims to install 510 GW of onshore and offshore wind energy by 2030. However, wind farms have had a difficult time coming to fruition in 2022 due to supply chain issues and high costs. This puts wind energy lower than Fit for 55 targets, despite this, there has been a 40 percent increase in wind installations in 2022 Member states have launched plans to expand wind capacity in the next few years. Long term goals hope to see 111 GW of offshore capacity by 2030 and current projects when completed will surpass Fit for 55 goals by 40 percent (Janipour, 2023). Germany, which has not prioritized wind in previous years due to dependence on Russian fuel, plans to install 10 GW of onshore wind power annually through its Onshore Wind Energy Act, seeing 5 times increase from 2018-2021 (Bundesregierung, 2022). It also plans to install 30 GW by 2030. Finland, Sweden, Estonia, Latvia, Lithuania, Poland, and Denmark have committed to producing 20 GW of wind power by 2030 up from 3 GW. The plan will install 1,700 offshore wind turbines equivalent to 20 nuclear power plants and provide enough energy for 20 million households (Euronews, 2022).

Italy commissioned its and the Mediterranean's first offshore wind farm in April 2022, while not developed as a result of the war it has inspired lawmakers to increase its offshore wind targets to 5 GW (Tedesco, 2021) by 2030 and has approved six new onshore wind farms as a long term strategy for energy security (TG24, 2022).

Solar

Solar is the fastest growing renewable energy in the EU, increasing by nearly 50 percent in 2022 and providing 12.2 percent of electricity generated in the EU between May and August of 2022, saving the EU nearly 29 billion euros in gas costs. (Czyżak, 2022). It is estimated that nearly 40 GW of solar PV, equivalent to nearly 4.6 billion cubic meters (BCM) of Russian gas, were installed across Europe in 2022 and enough to power 12.4 million homes (IEEFA, 2022). The EU needs to install around 60 GW of solar power in 2023 if it wishes to counteract the hole Russian gas has left for its energy needs. According to SolarPower Europe, the EU is expected to exceed 50 GW in 2023 (Ember, 2023) If current rates are maintained it is possible that the solar market could be 90 percent higher than expected in the Fit for 55 package, 4 years early, totaling 736 GW by 2030. To meet its goal in the Repower EU plan the EU will need to install 1,236 GW of wind and solar capacity by 2030, doubling energy supplies from 22 percent in 2020 until 2030 (Gabbatiss, 2022).

Germany has installed the most solar panels out of any other EU member state, providing nearly 8 GW in 2022, followed by Spain (7.5 GW) Poland (4.9 GW), the Netherlands (4.0 GW), and France (2.7 GW) seeing it as an affordable alternative to fossil fuels (Frost, 2022). 18 member states set new records for the amount of electricity generated from solar power during the Summer of 2022. The Netherlands, Germany, and Spain generate over 15 percent of their electricity from the sun (WEF, 2022). Poland has had 26 times rise in solar power generation since 2018, the highest among other member states. Finland and Hungary have had 5 times increase in generation and the Netherlands and Lithuania have increased by 4 times. Greece is now home to the largest double-sided solar farm in Europe, commissioned in April 2022, it has jumpstarted energy initiatives across the country by fast-tracking permits and licenses to increase its renewable capacity to 19 GW by 2030 (Campbell, 2022).

The EU solar strategy has proposed installing more rooftop solar panels, which could provide energy for ¼ of EU electricity needs (Bódis et. al, 2019). This would reduce reliance on imports from Asian countries by developing the European workforce and industry and reduce bureaucracy for new solar and wind project developments that would allow them to be installed and function faster.

Heat pumps

Heat pumps have also been installed across Europe to increase efficiency and reduce energy reliance and consumption for heating needs in buildings Increasing by 40 percent from 2021 to 2022 with a record of nearly 3 million heat pumps sold (IEA, 2023). Heat pump usage would aid in a dramatic reduction of carbon emissions, particularly as coal and oil facilities are replaced. Italy, France, and Germany accounted for almost half of European sales, and the Polish and Czechian heat pump market has doubled in size. In 2022, more heat pumps were sold than fossil fuel facilities in France thanks to a national ban on gas boilers in new buildings. 17 other European countries plan to follow suit in banning fossil fuel boilers for building heating. The EU has already been able to achieve its heat pump objectives for 20 million heat pumps installed four years early (EHPA, 2022). The EHPA estimates between 60-72 million heat pumps installed by 2030 in the EU, 50 percent higher than estimates in the Fit for 55 package (Ember, 2023).

Hydrogen

Hydrogen has seen renewed interest since the invasion as an option to reduce reliance on Russian gas and decarbonize heavily polluting sectors. As energy prices have increased, particularly with gas and oil, hydrogen prices seem much more affordable in comparison. However, the technology to manufacture and deploy hydrogen is nowhere near the scale needed to have an impact on the renewable energy transition in the EU, at least at this time. 95 percent of global hydrogen production uses fossil fuels, known as gray hydrogen, emitting more carbon into the atmosphere than the UK and Indonesia combined (Huet, 2022). Investment and interest in green hydrogen, produced using renewable electricity, seem promising, with the EU investing 3 billion euros into a green hydrogen bank to support development. Denmark has the highest green hydrogen targets in the EU, expecting to produce 4 to 6 GW annually by 2030. The Repower EU hopes to produce 10 million tons of green hydrogen and import 10 million tons of renewable hydrogen by 2030, although the plan was established before the war it has received overwhelming support since (Collins, 2022). Green hydrogen requires green renewable energies to further develop to bring market production levels to scale, expanding wind and solar will lead to the expansion of hydrogen infrastructure in turn.

Nuclear

Before the war, nuclear energy remained a sensitive topic in Europe, and a year later remains one of the top subjects of discussion among member states. In February 2022, the EU declared nuclear energy a "green" energy disregarding environmentalists' concerns over nuclear waste and potential accidents. Most EU member states are pro-nuclear however there are understandable fears surrounding nuclear power. Costs, the lack of control a state may have in the event of a nuclear disaster, and growing tensions between states such as Portugal and Spain in regard to the disposal process, usually regarding waterways. Germany decommissioned its last three nuclear power plants in April 2023 after multiple delays and debates over energy security and supply.

Yet, nuclear energy is heavily supported as a net zero alternative to other forms of energy and an opportunity to mitigate climate change effects faster than other non-fossil fuel alternatives. Nuclear power output is expected to grow by 3.6 percent per year from 2023 to 2025, especially as French capacity returns (WNN, 2023). Nuclear is now seen as a viable alternative to reduce reliance on Russian energy and meet the goals set out in the IPCC report to mitigate global temperature rises, so long as the nuclear industry continues growing over the next two decades (Campbell, 2022). Just before the start of the Russian invasion in February, French President Emmanuel Macron announced France's hopes to restore its nuclear arsenal to full capacity, a 'rebirth' of the nuclear energy industry. French nuclear power will provide over ⅓ of the absolute growth in nuclear generation as plants recover (WNN, 2023). This includes 14 new reactors to be built that will provide 25 GW of additional energy capacity. In Belgium, plans to phase out nuclear power have been postponed for 10 years after 2025 to ensure it is not reliant on other countries for energy. In Finland, Europe's long delayed nuclear reactor, the first in 16 years, was put into operation at the beginning of April. Nuclear power is expected to provide 40 percent of Finnish electricity needs ensuring energy security and climate goal achievement. While the debate for or against nuclear remains at a crossroads for EU lawmakers, nuclear power is gaining steam within the green movement as the focus shifts from environmental degradation by way of nuclear energy to the global climate crisis due to carbon emissions from fossil fuels.

Could this help meet established climate goals?

Russia's invasion of Ukraine completely overshadowed the Intergovernmental Panel on Climate Change's (IPCC) report on the impacts of the climate crisis and adaptation strategies released in April 2022. With a focus on the impacts the invasion has had on oil and gas supplies, the IPCC's report calling for the reduced use of fossil fuels and the unavoidable consequences for failure to curtail emissions have fallen on deaf ears.

Is it efficient and sustainable during and after the war?

The scope of this paper is unable to quantify the effects EU policies will have on the international fight against climate change at this point, especially in light of the most recent IPCC report. Current policies can only be viewed through a hypothetical lens and therefore cannot be factored into current climate action efforts for the next few years. However, with current trends, the EU is on target to meet the goals laid out in the Fit for 55 package which could lead to the implementation of more impactful climate and environmental goals.

Based on the 2021 report from the IPCC, emissions in the EU are still too high based on climate targets, but the hope with new green policies and shifts they soon could be in line with them. Often bureaucracy is what stands between policy and action, this is especially true for wind turbines. Costs, despite a booming market, have also discouraged many states from launching radical initiatives. Lastly, the importation of necessary raw materials and technologies means many states are weary of relying on other states to meet their climate goal needs.

It is essential for the global community to reassess the excessive toll of war and its effects on the environment. In order to fuel the war and fulfill militaristic needs, both Ukraine and Russia will need to rely on the excessive extraction of Earth's non-renewable resources. It is therefore essential for these countries and allies, who are supplying military weapons, to have direct control over resource rich areas, should the war continue for an extended period of time. "Militaries consume vast quantities of fossil fuels that contribute to the accumulation of carbon dioxide in the atmosphere and produce enormous quantities of toxic wastes that present environmental concerns at every stage of their life cycle" (Clark and Jorgenson, 2012 p. 566).

In turn, the effects war has on climate change are highly debated, with some arguing that it significantly contributes to and exacerbates conflict situations, while others believe it is a symptom with negligible impact. Globally there is a struggle to reconcile the need for effective and radical climate action while also taking into account international collaboration and conflict over resources and the global political order between Russia and its opponents to the war demands. The EU will need to make continual efforts to diversify its energy sector and support member states whose industries may struggle to transition due to reliance on fossil fuels, such as the chemical sector in Germany (Balmaceda et. al., 2023). It is also necessary to take into account the sheer amount of production needed and the toll it takes on human capital and the environment to achieve climate goals. Solar energy would need to increase nine times in order for the EU to be compatible with 1.5°C warming (Ember, 2023). Renewable energies and technologies require a vast number of resources and energy to produce, become costly, and have a devastating effect on the areas where they are extracted.

Pushback

Some critics argue that despite revisions to the Fit for 55 and the Repower EU plan, the EU's climate goals are still not ambitious enough to meet global climate needs as they are outdated and not in line with the current climate and energy action needed to mitigate and reverse negative climate change effects. Perhaps both plans should be revised yet again to account for current market trends and uncover the hidden potential found within rapidly growing energy transition trends.

It is also unknown how realistic some goals under the Fit for 55 plan are, specifically with hydrogen and biomethane. The amounts needed to be produced under the package and renewable power capacity do not seem to be aligned. Production capacity and transportation infrastructure needed for renewable hydrogen would significantly reduce the impact on emissions reduction goals and could not be fully accounted for a number of years (Gabbatiss, 2022).

States concerned with transiting dependencies that can be weaponized in future events or have a significant impact on global markets leave some EU member states in fear of what may come with a

successful green transition. China holds a large share of technologies and raw materials that are vital for renewable energies and the US' Inflation Reduction Act (IRA) leaves an opportunity for dependency and deindustrialization in the EU if the supply chain is not diverse enough.

Jarosław Kaczyński, the chairman of Poland's ruling party has called the green transition "green communism" insisting that the Fit for 55 will only benefit the rich Europeans at the expense of the poor. He argues that current efforts to transition do not come at a good time because the EU should focus on the quality of life for average Europeans and the European economy (Tilles, 2023). Opposition across Europe echoes these sentiments somewhat, with critics arguing that carbon taxes on fuel and other reforms could lead to disapproval from EU citizens. The Social Climate Fund is expected to alleviate some of these fears, but only time will tell.

Conclusion

In conclusion, the EU green transition in light of the Russian war in Ukraine seems to be promising despite a few expected hurdles. It is essential that the EU use this momentum to ensure a just and impactful transition to renewable energies over the next few years. Even after the war has ended, it is vital that the EU continues on the path towards becoming the first carbon-neutral continent and push the rest of the world towards more progressive green policies that do not place oil and gas at the center as "clean" options. Eyes are on Europe as it attempts to decouple itself away from full dependency on others, establishing its own energy security and cementing its place as a global leader in climate action.

REFERENCES AND BIBLIOGRAPHY

"Almost 40 Gigawatts of Solar Expected to Be Installed in Europe in 2022." n.d. Accessed May 11, 2023. https://ieefa.org/articles/almost-40-gigawatts-solar-expected-be-installed-europe-2022.

"Baltic States Pledge Wind Power Hike to Cut Reliance on Russian Gas." 2022. Euronews. August 31, 2022. https://www.euronews.com/2022/08/31/finland-sweden-estonia-latvia-lithuania-poland-and-denmark-pledge-wind-power-increase.

"Belgium Postpones Nuclear Energy Phase-out by 10 Years over Ukraine." 2022. Euronews. March 19, 2022. https://www.euronews.com/2022/03/19/nuclear-energy-belgium-postpones-phase-out-by-10-years-due-to-ukraine-war?_hsenc=p2ANqtz-9FMOwcUaAKZaf2ueJ-yBx8cUuYw0tAup501BmeIQAdDmoAYEJFz9cIcQbTLxUkLyUti8Bb-VVVNzqlNivplbYb5gbtInBb9xwQ7PO-V6uYRduraeU&_hsmi=59205821.

Bódis, Katalin, Ioannis Kougias, Arnulf Jäger-Waldau, Nigel Taylor, and Sándor Szabó. 2019. "A High-Resolution Geospatial Assessment of the Rooftop Solar Photovoltaic Potential in the European Union." *Renewable and Sustainable Energy Reviews* 114 (October): 109309. https://doi.org/10.1016/j.rser.2019.109309.

Campbell, Charlie. 2022. "As Putin Threatens Nuclear Disaster, Europe Learns to Embrace Nuclear Energy Again." Time. April 21, 2022. https://time.com/6169164/ukraine-nuclear-energy-europe/.

Campbell, Maeve. 2022. "Greece Opens the Largest Double-Sided Solar Farm in Europe." Euronews. April 7, 2022. https://www.euronews.com/green/2022/04/07/largest-double-sided-solar-farm-in-europe-opens-in-greece-supplying-power-to-75-000-househ.

Collins, Leigh. 2022. "Ukraine War | Denmark Approves New Green Hydrogen Tender and 4-6GW Target for 2030." Recharge | Latest Renewable Energy News. March 15, 2022. https://www.rechargenews.com/energy-transition/ukraine-war-denmark-approves-new-green-hydrogen-tender-and-4-6gw-target-for-2030/2-1-1185065.

Cremona, Elisabeth. 2023. "Fit for the Future, Not Fit-for-55." Ember. February 28, 2023. https://ember-climate.org/insights/research/fit-for-the-future-not-fit-for-55/.

Czyżak, Paweł, and Uusivuori Erika. 2022a. "Shocked into Action - EU Countries' Energy Policies." Ember. June 1, 2022. https://ember-climate.org/insights/research/eu-slashes-fossil-fuels/.

Czyżak, Paweł. 2022b. "EU's Record Solar Summer Helps Avoid €29bn in Gas Imports." Ember. September 7, 2022. https://ember-climate.org/insights/research/record-solar-summer-in-europe-saves-billions-in-gas-imports/.

Domm, Patti. 2023. "The Russia-Ukraine War Remapped the World's Energy Supplies, Putting the U.S. at the Top for Years to Come." CNBC. March 3, 2023. https://www.cnbc.com/2023/03/03/ceraweek-how-russias-war-made-the-us-a-dominant-supplier-of-energy-.html.

Eberhart, Dan. n.d. "Ukraine War Illustrates Importance of American Energy Dominance." Forbes. Accessed May 11, 2023. https://www.forbes.com/sites/daneberhart/2023/02/24/ukraine-war-illustrates-importance-of-american-energy-dominance/.

"Energy Security - About." n.d. IEA. Accessed May 11, 2023. https://www.iea.org/about/energy-security.

"European Union (EU27) | European Alternative Fuels Observatory." n.d. Accessed May 11, 2023. https://alternative-fuels-observatory.ec.europa.eu/transport-mode/road/european-union-eu27.

"Expanding wind energy for Germany | Federal Government." 2022. Die Bundesregierung informiert | Startseite. July 8, 2022. https://www.bundesregierung.de/breg-de/themen/klimaschutz/onshore-wind-energy-act-2060954.

Farah, Paolo Davide, and Piercarlo Rossi. 2011. "National Energy Policies and Energy Security in the Context of Climate Change and Global Environmental Risks: A Theoretical Framework for Reconciling Domestic and International Law Through a Multiscalar and Multilevel Approach." SSRN Scholarly Paper. Rochester, NY. https://papers.ssrn.com/abstract=1970698.

Frost, Rosie. 2022. "Which EU Country Installed the Most Solar Power in 2022?" Euronews. December 20, 2022. https://www.euronews.com/green/2022/12/20/eu-solar-power-soars-by-almost-50-in-2022-which-country-installed-the-most.

Gabbatiss, Josh. 2022. "In-Depth Q&A: How the EU Plans to End Its Reliance on Russian Fossil Fuels." Carbon Brief. May 20, 2022. https://www.carbonbrief.org/in-depth-qa-how-the-eu-plans-to-end-its-reliance-on-russian-fossil-fuels/.

Guevara, Patricia. n.d. "Energy Security: Definition and Importance." SafetyCulture. Accessed May 11, 2023. https://safetyculture.com/topics/energy-security/.

Huet, Natalie. 2022. "Europe's Energy Crisis Is Boosting Green Hydrogen. Is It the Future?" Euronews. November 24, 2022. https://www.euronews.com/next/2022/11/24/europe-energy-crisis-is-boosting-green-hydrogen-is-it-finally-a-real-alternative.

"IEA Highlights Nuclear's Key Role in Coming Years : Energy & Environment - World Nuclear News." n.d. Accessed May 11, 2023. https://www.world-nuclear-news.org/Articles/IEA-highlights-nuclear-s-key-role-in-coming-years.

IPCC. 2022. "Climate Change 2022: Impacts, Adaptation, and Vulnerability." Intergovernmental Panel on Climate Change. Accessed May 11, 2023. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

Janipour, Zahra. n.d. "Great Efforts Required to Achieve EU Countries' National Offshore Wind Energy Targets." Rabobank. Accessed May 11, 2023. https://www.rabobank.com/knowledge/d011347929-great-efforts-required-to-achieve-eu-countries-national-offshore-wind-energy-targets.

Jones, Dave. 2023. "European Electricity Review 2023." Ember. January 31, 2023. https://ember-climate.org/insights/research/european-electricity-review-2023/.

Masterson, Victoria. 2022. "Here's How Solar Energy Saved Europeans $29 Billion This Summer." World Economic Forum. October 3, 2022. https://www.weforum.org/agenda/2022/10/solar-power-europe-energy-transition/.

Monschauer, Yannick, Chiara Delmastro, and Rafael Martinez-Gordon. n.d. "Global Heat Pump Sales Continue Double-Digit Growth – Analysis." IEA. Accessed May 11, 2023. https://www.iea.org/commentaries/global-heat-pump-sales-continue-double-digit-growth.

Myllyvirta, Lauri. 2023. "Russia–Ukraine War Has Not Led to Increased Fossil Fuel Consumption in the EU." Centre for Research on Energy and Clean Air. February 13, 2023. https://energyandcleanair.org/russia-ukraine-war-has-not-led-to-increased-fossil-fuel-consumption-in-the-eu/.

Pavlenko, Margarita Balmaceda, Sam Greene, Benjamin Schmitt, Janis Kluge, Olena. 2023. "Winning Europe's Energy War with Russia." CEPA. March 30, 2023. https://cepa.org/comprehensive-reports/winning-europes-energy-war-with-russia/.

"Repower EU: Heat Pump Strategy Required to Help Sector Deliver." n.d. European Heat Pump Association. Accessed May 11, 2023.

https://www.ehpa.org/2022/06/12/ehpa_news/repowereu-heat-pump-strategy-required-to-help-sector-deliver/.

Ruhnau, Oliver, Clemens Stiewe, Jarusch Muessel, and Lion Hirth. 2022. "Gas Demand in Times of Crisis: Energy Savings by Consumer Group in Germany." Working Paper. Kiel, Hamburg: ZBW – Leibniz Information Centre for Economics. https://www.econstor.eu/handle/10419/265522.

Tedesco, Enza. 2021. "Italy Aims for 5 GW Floating Wind by 2040 – Anev." Montel. January 26, 2021. https://www.montelnews.com/news/1189892/italy-aims-for-5-gw-floating-wind-by-2040--anev.

"The Med Gets First Offshore Wind Farm as Italy Vows Energy Revolution." 2022. France 24. March 16, 2022. https://www.france24.com/en/live-news/20220316-the-med-gets-first-offshore-wind-farm-as-italy-vows-energy-revolution.

Tilles, Daniel. 2023. "Kaczyński Condemns EU's 'Green Communism' as Poland Opposes Emission Cuts Plan." *Notes From Poland* (blog). April 24, 2023. https://notesfrompoland.com/2023/04/24/kaczynski-condemns-eus-green-communism-as-poland-opposes-emission-cuts-plan/.

"Trends in Electric Light-Duty Vehicles – Global EV Outlook 2022 – Analysis." n.d. IEA. Accessed May 11, 2023. https://www.iea.org/reports/global-ev-outlook-2022/trends-in-electric-light-duty-vehicles.

"War and Subsidies Have Turbocharged the Green Transition | The Economist." n.d. Accessed May 11, 2023. https://www.economist.com/finance-and-economics/2023/02/13/war-and-subsidies-have-turbocharged-the-green-transition.

Zaretskaya, Victoria. n.d. "U.S. Liquefied Natural Gas Exports to Europe Increased during the First 4 Months of 2022." Accessed May 11, 2023. https://www.eia.gov/todayinenergy/detail.php?id=52659.

Zsuzsanna, Szabo. 2023. "Netherlands Will Shut down Tremor-Prone Groningen Gas Field Despite Energy Security Concerns." Upstream Online | Latest Oil and Gas News. January 24, 2023. https://www.upstreamonline.com/production/netherlands-will-shut-down-tremor-prone-groningen-gas-field-despite-energy-security-concerns/2-1-1392641.

***Biography:** Renée N. Stoute is a Ph.D. student at the American Graduate School in Paris (AGS) studying International Relations and Diplomacy. Her research focuses on climate and environmental policy and diplomacy, climate security, and European international relations. She completed her Masters in International Relations and Diplomacy in 2021 from AGS and wrote her thesis on multinational corporations' need to transition to green energy by using the UN's Sustainable Development Goals.