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Navigating the Nexus: Energy Security, Climate Mitigation, and Recovery of the European Union and Ukraine – an Overview

EXECUTIVE SUMMARY

Due to the energy crisis exacerbated by the invasion of Ukraine and the ongoing and pressing issue of climate change, the EU is forced to balance out its energy security strategy while considering climate related issues. The past interconnection of Europe Union and Russia through the Nord Stream pipeline has made it inevitable for Europe to consider alternatives to compensate for the losses caused by the globally recognized condemnation of Russian actions. The EU has utilized the momentum to introduce new mechanism such as Repower EU and similarly has dedicated attention to relevant climate related instruments such as the Fit for 55.

With the analysis of these two initiatives, the paper brings an overview of current drivers and barriers within this newly arising connection while introducing three opportunities. Ukraine's long-term prospects lie in deeper integration with Europe, enhancing connectivity with European energy markets and collaborating with the private sector to advance renewable energy and hydrogen production. Ukraine's surplus energy generation capacity and progress in the nuclear sector attracts attention of investors and world politics. The development of renewable energy in Ukraine can help the EU become more energy independent and less vulnerable to external threats.

Nuclear energy is part of the EU's 2020/852 taxonomy classification system and can help achieve the goal of balancing energy security with the goal of climate change mitigation. The EU Joint Research Centre's technical evaluation of nuclear energy found that it produces minimal emissions and has a low fatality rate. Academic proponents argue that nuclear power fits into a strategy of ecological modernization and can help limit carbon emissions per person. Promoting nuclear energy in a similar manner would enhance European energy grid stability.

Lastly, the paper considers direct carbon pricing which can be implemented through enhancing the energy taxation directive accompanying the already existing carbon tax and cap-and-trade system. The EU Emission Trading System (EU ETS) is the oldest carbon pricing policy, targeting pollution from power, industry, and aviation sectors. However, its current rate is volatile and insufficient to incentivize transition to neutrality. The EU should establish a more comprehensive fiscal mechanism for its carbon market, to support climate ambition for 2030.

INTRO

This paper has the central objective of evaluating existing strategies and policies designed to mitigate risks and ensure equitable access to crucial energy resources while aligning with global environmental goals. The primary focus is on analyzing two key legislative frameworks, namely the 'Fit for 55' package within the Green Deal and the initiatives outlined in 'RePowerEU.' These legislative components collectively lay the foundation for a renewed energy security policy framework in Europe with a strong emphasis on climate and energy security. Additionally, the paper identifies three key opportunities for addressing the arising nexus: leveraging the added value of a post-war Ukraine, promoting the implementation of nuclear energy,

and advocating for the establishment of a stringent carbon tax. Through this, the paper aims to provide a general overview of the existing developments in effective and sustainable energy policies in the European context.

Two strategic EU policy goals are of paramount importance: the pursuit of energy security and the imperative to mitigate climate change and limit global warming. These objectives are deeply intertwined, presenting complex challenges that resonate globally.

The global energy system has predominantly been viewed from a bidimensional perspective, primarily focusing on the geopolitical and economic aspects of energy transition. More recently, a third dimension - security - has been considered, as the energy crisis has sparked a rethink of how Europe defines and prioritises its energy security. [i]

The EU has witnessed a significant shift in its legislative focus, which now primarily emphasizes reducing energy demand rather than accommodating it with cleaner, low-carbon alternatives. [ii] The effectiveness of proposed legislative implementations, the reliability of renewable energy sources, as well as the inclusion of nuclear energy are essential considerations in this transition. The transition must be executed seamlessly, considering the vast scale of the energy system, and avoiding disruptions in energy supply, as energy is often regarded as the *lifeblood* of modern societies, underpinning various daily services, including heating, cooling, lighting, telecommunication, information technology, and transport.

According to Eurostat estimates[iii], the European energy industry comprises more than 175,000 enterprises, employing around 1.6 million people, and boasting a turnover of approximately EUR 1.9 trillion across the supply chain within the EU. Undoubtedly, this sector holds immense significance for Europe and should be a top priority in adapting to current climatic and geopolitical challenges as the region looks toward the future.

WHAT'S AT STAKE- CORRELATION BETWEEN ENERGY AND CLIMATE

The focus is on the intertwined relationship between energy generation and climate change, highlighting the significant contribution of carbon dioxide emissions from fossil fuels to both phenomena. According to the European commission[iv], fossil fuels, such as coal, oil and gas, are among the biggest contributors to European climate change accounting for over 75% of all EU greenhouse gas emissions. This is reportedly similar to the global percentage coming from the energy sector which also makes up to nearly 90 percent of all carbon dioxide emissions.[v]

The consequences of climate change impact various aspects of energy systems, necessitating a shift towards sustainable sources like solar and wind power. While such transitions mitigate greenhouse gas emissions and water consumption, they also face challenges due to their dependence on weather conditions, leading to increased uncertainty in renewable energy sources. [vi] The vulnerability of energy infrastructure to extreme weather events underscores the need for restructuring and reinforcement to enhance resilience. Climate-induced shifts in energy demand, particularly for cooling and heating, may require additional infrastructure investments. Changes in water availability pose a threat to hydropower and thermal power plants reliant on water for cooling processes. Consequently, it is imperative for all stakeholders in the energy system to consider and incorporate climate considerations into their future developments. The entire energy industry must be attentive to the challenges posed by climate change and take measures to enhance climate resilience.

HOW FIT IS FIT FOR 55

The most extensive collection of environmental regulations, with the objective of achieving carbon neutrality in the European Union, thereby becoming the inaugural carbon-neutral continent by 2050, is known as the Green Deal, which includes the Fit for 55 package. The Fit for 55 package aims to introduce a pertinent strategy for climate mitigation. Its core objective is to harmonize EU policies with the updated climate targets outlined in the EU Climate Law, which entails achieving at least a 55% reduction in net emissions by 2030.
The question that Fit for 55 fails to address is that, if this reduction is successful and the EU manages to cut its emissions by 55%, how would that actually contribute to climate mitigation? By how much would we decrease the risk of a climate crisis? To what degree will it save us? To what extent can the renewable energy-driven energy grid support the demand of growing electricity consumption?

The question that the Fit for 55 addresses includes the implementation of the measures outlined in the package; and how the European Union's economy will shift towards enhanced energy security and resilience, bolstering its position in the global low-carbon market. Nonetheless, this economic transition will not be free from adverse side effects, particularly in the realm of societal consequences and the necessary expenses associated with investments.[vii]

However, the concept of a low-carbon energy mix presented in Fit for 55, with a sufficient share of renewable energy sources, could lead to increased energy security, especially for countries like Slovakia. The formula goes as follows: the decrease in imports reduces dependence on the external environment which results in increased energy independence and increased energy security. Looking at Slovakia and similar EU countries, their biggest problem is the lack of gas and oil inside their territory, which consequently leads to high dependency on other countries for such resource-generated energy. When the Fit for 55 package is implemented, countries like Slovakia could see the biggest change in terms of shifting their energy dependency.

"Together with renewables, Slovakia could achieve almost 90% emission-free electricity generation. More than half of Slovakia's electricity comes from emission-free nuclear power plants." reports the Slovak Institute for Environmental Politics.[viii]

The pledge to attain carbon neutrality by 2050 will encourage investment in low-carbon technologies. This, in turn, will lead to achieving important advantages, including energy conservation, the sustainable management of natural resources, and a reduction in pollution.

It's worth highlighting that, alongside criticisms of the Fit for 55 package, there is substantial backing for its objectives and measures, particularly from environmental groups and proponents of more aggressive climate action. The package's effectiveness will hinge on its capacity to strike a balance between the imperative for climate action and the economic and social factors, while also gaining support from diverse stakeholders. Overall, the fit for 55 package under the green deal is an ambitious start that needs constant monitoring and re-evaluation to align with the ongoing climate emergency and energy security related to world conflicts. Similarly, the package needs support from Member States, which must go beyond their national targets by vigorously putting the framework into action, especially by executing far-reaching national energy and climate plans (NECPs).

CAN THE EU TRULY BE REPOWERED BY THE REPOWER EU INITIATIVE

In the effort to bring the EU to a sustained recovery, RepowerEU emerged in reaction to the challenges and global energy market turbulence resulting from Russia's invasion of Ukraine. Its primary objective is to reduce the European Union's energy reliance by diversifying energy resources and bolstering energy storage. This initiative extends and builds upon existing programs, such as the Recovery and Resilience Facility, while elevating the renewable energy target of the previously introduced Fit for 55 package from 40% to 45%.[ix] But what really matters is emissions, not the share of renewables.

The International Energy Agency (IEA) believes that some of the goals included under the REPowerEU initiative seem to be overambitious and unrealistic. In the renewable electricity sector of the initiative the IEA views "the solar PV and wind capacity expansion [to be] insufficient to reach the REPowerEU plan's renewable electricity objectives for 2030". These objectives modelled by the EU commission for renewables have been set to achieve a 69% share of renewable electricity by 2030,[x] whereas the realistic numbers that the international energy agency sees as achievable lie 15 percentage points below at a 54% share of renewables-based generation in the electricity sector[xi].

Similarly, the EU's ambition to increase the share of renewable energy in transport to 32% seems impossible as the IEA predicts this share of renewable energy sources (RES) can climb to optimistically to 16% by 2027 and 20% by 2030. To meet the REPowerEU requirement, policies should prioritize increasing the utilization of biofuels, enhancing electric vehicle sales, expanding infrastructure for renewable electricity, and implementing energy conservation and efficiency measures. Enacting these measures in the accelerated scenario would propel the European Union towards a 29% renewable energy share by 2030, although this would still not fully meet the REPowerEU mandate.[xii] The trend is repeated in the heating and cooling sector as the current forecasts for developing renewable heating systems fall significantly short of the requirements set by REPowerEU.

Overall, REpowerEU can repower the EU to some extent while it may not achieve all its overambitious goals by the given deadline. Repower EU is a good instrument as it seeks to provide affordable energy which is now a necessity for the region. With more expensive energy in current geopolitical turbulences a link can be established that actually benefits wealth economic growth and development.

Against this backdrop, enhancing Europe's capacity to produce clean energy equipment throughout their supply chains would safeguard the EU's climate goals, preventing the risk of relying on imports from other regions, but only partially as the initiative would not be fully achieved. Achieving the REPowerEU ambitions for 2030 will require considerably faster RES uptake in most member countries to accelerate progress in all three proposed sectors. Additionally, the repower EU should address the amount of emissions produced more closely rather than focusing primarily on the share of renewables. Within the nexus, Europe's energy security concern has been the close dependency on Russian natural gas. Now with REPowerEU we see the reestablishment of renewable energy sources to EUs energy grids which aligns with the energy security goals of the EU as this allows EU to strive away from dependence. On the contrary, even though REPowerEU managed to avert the danger of energy supply shortage, it was at a very hight cost and the price of electricity skyrocketed. Currently, the EU has the highest electricity household prices in the world with German households at the peak paying 49.5 c€/kWh.[xiii]

OPPORTUNITIES

1. RENEWABLE UKRAINE

The recovery of Ukraine should be high on the EU's agenda. Undoubtably Europe's energy sector has been severely hit by the war as the interruptions in the supply of Russian gas have uncovered Europe's vulnerability. Consequently, the EU was forced to launch unprecedented crisis management measures, both on the supply and demand side.[xiv]

Why is Ukraine an asset? Central to Ukraine's long-term prospects is a deeper integration with Europe, which is equally vital for its energy industry as well as other sectors. This initiative to integrate should come also from the EUs side, as it will not only aid with the recovery of Ukraine but it is also likely to support the EU's energy strategy. In pursuit of this goal, Ukraine should persist in enhancing its connectivity with

European energy markets and collaborate with the private sector to advance its renewable energy domain, and possibly explore hydrogen production. Additionally, Ukraine has a surplus of energy generation capacity as a result of the fall of the Soviet Union, followed by massive deindustrialisation. The opportunity here is to initiate the recovery of these existing capacities that can later be utilized.[xv]

As brought forward by GLOBSEC's Joseph Fraley, Ukraine's candidate status attracts attention not only of the world politics but also of investors from multiple sectors including energy. Ukraine, if victorious in the war with Russia ideally within a year or so can be a clean canvas for a huge rebuilding project for the whole energy sector. This is also an opportunity for the EU to grow a sustainable base of renewable energy to support the EU's quest for energy security. Europe considers renewables as a way out of the climate emergency even though currently the EU simply does not have the required level of solar and wind capacity to become completely energy independent. From this perspective, Ukraine is seen as a valuable asset that can play a role in addressing both energy security and climate change mitigation.[xvi]

Furthermore, and despite the invasion, Ukraine is progressing in nuclear energy. Earlier last year, Ukraine's Minister of Energy, Herman Halushchenko, announced a pivotal decision by the Cabinet of Ministers to initiate the development of technical documentation for new types of nuclear reactors. The decision aims to construct two power units using AP1000 reactors at Khmelnitsky by 2030-2032.The move is seen as a strategic shift toward modern technologies, enhancing safety and performance in Ukraine's nuclear energy industry, which further enhances Ukraine's assets. This decision is a clear indication of Ukraine's efforts to strengthen energy infrastructure and align Ukrainian energy with Western standards. Since Ukraine is still under attack, IAEA experts are stationed at all Ukrainian nuclear plants to enhance safety measures. This all is signalling a comprehensive shift in nuclear energy for Ukraine.[xvii]

The development of renewable energy in Ukraine does not, by itself, completely resolve Europe's energy security challenges. However, it represents a significant step toward making this goal a reality. Ukraine's extensive windswept territory and its Black Sea coastline offer a vast source of wind energy that can contribute to powering Europe. Moreover, Ukraine's solar and biomass potential can substantially bolster the European Union's energy resources.

If Ukraine's energy potential is fully harnessed, the EU would be less susceptible to external threats from countries attempting to disrupt solar or wind energy supplies. Secondly, it has the potential to encourage Eastern European member states to become more committed to a faster transition toward sustainable energy. If Ukraine continues to emphasize its commitment to green energy in its development plans, Eastern European member states are likely to follow suit and support Ukraine's aspirations.[xviii]

In conclusion: Ukraine as a part of the EU electricity net can enhance the stabilization of the industry.

2. WHERE DID NUCLEAR GO?

The European Commission has highlighted that achieving a reduction of greenhouse gas emissions by at least 55% by 2030 necessitates increased reliance on renewable energy sources, low -carbon energy sources, such as nuclear energy, and improved energy efficiency.[xix] Yes, it seems that wind and solar are increasing energy production every year, but their output is patchy and not always matches the demand. Too much reliance on weather dependent energy embodies actually a risk for the stability of the grid. Therefore, there is a hovering question surrounding the long-term reliability and security of these sources, which isn't frequently addressed within European institutions. Now that nuclear energy is a part of the (EU) 2020/852 (the 'Taxonomy Regulation') classification system it can play a substantial role in assisting the European Union in reaching its goal of reducing carbon emissions by 55%.

The Joint Research Centre's (JRC) technical evaluation of nuclear energy, conducted in response to discussions on the Taxonomy Regulation and the inclusion of various industries, dispels some of the primary

concerns held by the European population regarding nuclear power. The report finds that the average greenhouse gas emissions throughout the lifecycle of nuclear energy electricity production are similar to those associated with hydropower and wind energy. Furthermore, nuclear energy exhibits very minimal emissions of NOx (nitrous oxides), SO2 (sulphur dioxide), PM (particulate matter), and NMVOC (non-methane volatile organic compounds), with values comparable to, or even better than, emissions from the solar photovoltaic and wind energy sectors. In terms of public safety, the typical annual exposure of an individual to radiation resulting from nuclear energy-based electricity generation is approximately 0.2 microsieverts. This exposure is exceedingly low, being ten thousand times less than the average yearly dose from natural background radiation. Regarding public exposure during accidents, the assessment compares severe accident fatality rates and the most severe consequences, in terms of fatalities. It is found that current Western Generation II Nuclear Power Plants (NPPs) exhibit an exceptionally low fatality rate. This rate is significantly lower than that associated with any form of fossil fuel-based electricity production technology and is comparable to hydropower in OECD countries and wind power, with only solar power having a notably lower fatality rate.[xx]

Arguments by the JRC align with the ones in academia as most reviewed academic works seem to support nuclear energy. Academic proponents of the relatively novel way of generating power state that "nuclear energy fits well into a strategy of so-called 'ecological modernization' which endorses the concept of sustainable growth"[xxi] as they consider the benefits, they have observed over the last 30 years, and they come to the conclusion that nuclear power has been one of the major factors that have helped limit the level of C02 emissions per person. Electricity generation from the nuclear fuel cycle results in only 4% of the C02 emitted by the generation of electricity from coal. Globally, nuclear power saves 490 million tonnes of carbon emissions a year compared to generating the same amount of electricity from coal. In sum, nuclear power stations save the emission of around 20 million tonnes of carbon each year."[xxii]

Promoting and marketing nuclear energy in a manner similar to renewables will significantly enhance the stability of European energy grids in contrast to those heavily reliant on weather-dependent energy sources. This applies to energy security and how nations can attain a highly dependable grid, aligning with the IEA's definition of energy security, which revolves around the continuous availability of energy resources at an affordable cost. Similarly, having nuclear energy within European energy grids would suffice to fulfil the promise of the Commission to diversify energy sources in a very safe, stable and low carbon way. Most of the opposing arguments toward nuclear energy are in this sense emotion driven. When talking about the fear behind nuclear energy, it is clear based on provided facts that this fear is many times subjective rather than looking at how it could, in a time of climate urgency, help lower energy dependence and ensure energy security while meeting climate mitigation objectives.

3. THE SINNER HAS TO PAY

There are two primary ways trough which direct carbon pricing can be implemented: 1/ by imposing a carbon *tax* or 2/ by setting up a *cap- and-trade* system. The European Union was the first to establish a cap-and -trade instrument across its member states called the EU Emission Trading System (EU ETS), making it the oldest carbon pricing policy of this kind. The EU ETS targets pollution from 3 sectors: power, industry and aviation, by pricing greenhouse gas (GHG) emissions.

While the EU ETS seems to be working, most of its success has been achieved in combination with other environmental instruments imposed within the EU such as the the Renewable Energy, Energy Efficiency and Ecodesign Directives. The EU ETS when standing on its own seems to be rather volatile and never sufficiently high. The European Environmental Bureau suggest that "The current ETS rate of €25/tCO2 is insufficient to incentivize the transition to neutrality effectively (at least €100/tCO2 is needed)."[xxiii]
The EU ETS State Aid regulations enable member states to offer domestic compensation plans for supporting competitive energy-intensive industries. However, this government assistance conflicts with the "polluter

pays principle" and undermines decarbonization goals. Large subsidies to businesses, coupled with price volatility and reductions, are currently diminishing the environmental efficacy of the EU ETS market.

There has been an ongoing debate around the second type of carbon pricing mechanism carbon tax to be implemented to contribute to the joined efforts of the EU ETS and the 3 aforementioned directives. In the past it was among the EU's goals to establish a carbon tax, but the focus on "cost efficiency" became central, mostly because EU-level emissions trading legislation would involve qualified majority voting by member states, in contrast to the unanimity needed for fiscal measures such as a carbon tax.
Now, however, with the climate situation exponentially worsening, the EU should make the commitment to establish a fiscal mechanism for its carbon market. Currently, taxation rules for in the EU energy sector are regulated through the EU Energy Taxation Directive. This directive respecting member states competences, sets a unified lower level of required tax rate.

This directive can be utilised and altered to accommodate the need of the evolving relationship between energy security and climate mitigation. Through the directive, a carbon tax can be implemented which would significantly support the increased climate ambition for 2030.[xxiv]

The combination of the two-carbon pricing mechanism will strengthen the efforts of climate mitigation which will force member states to reconsider a faster transition to renewable energy sources that fit within carbon related policies and are cheaper in this regard.

Carbon taxes have considerable economic, environmental, and practical benefits, especially for developing nations. This is because they are simple to administer, have a stable price that encourages investment, have the ability to generate sizable amounts of income, and cover a wider range of emissions sources. ETSs, on the other hand, offer more assurance regarding emissions levels, can be put into place by environment ministries, and certain free permit allocations may get political support from impacted businesses (at a cost to the government's coffers). Since both mechanisms have considerable advantages, both should be implemented form the EU level.

This approach would not just prevent the delay of much-needed emission reductions but also contribute significantly to decreasing the greenhouse gas emissions allocation that the EU anticipates using until 2030.

CONCLUSIONS and POLICY RECOMMENDATIONS

Consequently, the energy system requires a transition towards cleaner energy sources that can significantly reduce greenhouse gas emissions while meeting the increasing energy demands. Both the EU and the global energy system face the challenge of developing a strategy that harmonizes two disparate goals: energy and climate security.
Failure to take action today not only necessitates more rapid and less cost-efficient efforts in the future but also results in increased societal costs and permanent damages, affecting generations to come.

How can the European Union effectively balance the pursuit of energy security and climate change mitigation within its evolving role, with specific consideration given to strategies such as involving Ukraine, the integration of nuclear energy, and the implementation of a stringent carbon tax? The brief recommends the following for the EU to consider.

Unified outlook on nuclear power diplomacy

- There has been mention of noteworthy polarization in the EU bubble over how to address nuclear energy, with Germany completely phasing it out, closing their last nuclear powerplant last year, while France and CEE countries are advocating for nuclear. If the EU wanted to achieve a stable low-carbon energy grid that falls under its strict environmental policy, EU should unify over nuclear energy and should implement it as it is a low-carbon energy source going forward.

Clearly foster cooperation with Ukraine

- The European Commission needs to make a formal written statement on the renewable energy potential of Ukraine. The Ukrainian government should publish materials for policymakers that show how the renewable potential for the EU changes when Ukraine is included. The Ukrainian government and European Commission should jointly work on the creation of promotional materials and information for green investors.

A unified carbon tax is to be implemented under the directive

- Strengthen the EU Energy Taxation Directive and implement a comprehensive carbon tax to complement the existing carbon cap in the form of ETS and the CBAM. The tax should widen its scope by applying to the European internal industrial market.

Resilient infrastructure

- Climate change affects the entire energy supply chain, including fuel production, mining power generation, and grids. Energy networks need to be robust and reliable to operate under climate shocks. The EU should dedicate funding to support industries in their transition to more efficient and resilient remedies.

Bigger, budget realistic, rational goals

- The EU should involve the private sector and financial institutions through increased activity and engagement of the TEIs within the nexus of energy and climate, while rationalizing their set goals. This combination of more money and rational goals will make the trajectory of achieving climate mitigation easier.

Mitigation and adaptation

- Establish a robust monitoring and reporting system to track progress, assess the effectiveness of measures, and make necessary adjustments, tthrough better communication between existing and relevant Directorate-Generals.

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