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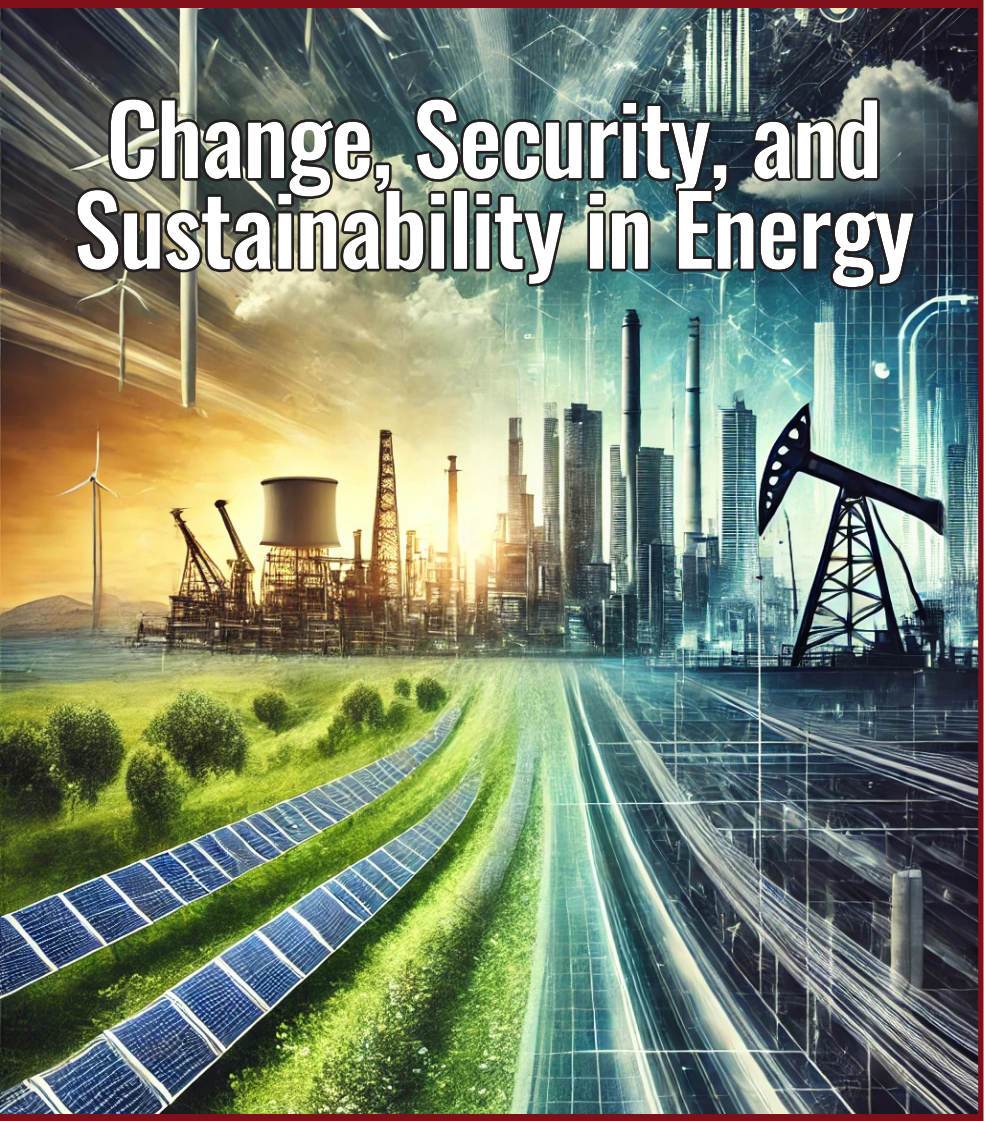

Change, Security, and Sustainability in Energy

· Berk Türkel · Fatih Barış Altunyuva · Emrah Özsavaşçı · Joe Calnan · Melih Dinçer ·
· Ilya Roubanis · Vilen Mnatsakanyan · Gökhan Bafra · İsmail Aykın · Lorenzo Somigli ·

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Change, Security, and Sustainability in Energy

The rapid pace of geopolitical change, the urgent necessity for sustainability, and the fundamental importance of energy security converge to shape our complex global landscape today. This issue of Transatlantic Policy Quarterly delves into "Change, Security, and Sustainability in Energy," offering insights from scholars and professionals on how regions and nations are navigating this pivotal transformation.

Professors Amelia Hadfield and Mustafa Demir start by examining the intersection of EU integration and energy security in the Balkans, arguing for strategic autonomy to enhance stability and resilience in this critical region. Professor Ioan Gâf-Deac builds on the regional focus with an exploration of Black Sea energy cooperation among Romania, Bulgaria, and Türkiye, underscoring the benefits of multilateral initiatives in bolstering security.

From a transatlantic perspective, Professor Mehmet Efe Biresselioglu offers a nuanced look at the energy transition's impact on security dynamics between North America and Europe, where the imperative for green energy meets geopolitical pressures. Meanwhile, Professor Devender Kumar broadens the scope by analyzing China's engagements with the BRICS, illuminating how energy policy influences regional geopolitics and bilateral relations.

Berk Türkel and Dr. Fatih Barış Altunyuva both contribute forward-thinking perspectives on Türkiye and Europe's evolving energy security frameworks in light of recent conflicts. Türkel addresses the challenges of green transformation in a conflict-prone environment, while Altunyuva advocates for a multidimensional approach to redefine energy security in a world of competing priorities.

Emrah Özsavaşçı reminds us of the human element in energy transition, calling for inclusive policies that ensure no one is left behind as the world shifts to cleaner energy sources. Joe Calnan presents Canada's potential contributions to transatlantic energy security and explores the political hurdles that stand in the way of fulfilling this role.

Looking to the future, Dr. Melih Dinçer examines how upcoming European Parliament elections might impact the European Green Deal, with repercussions for energy and environmental policy across the continent. Ilya Roubanis discusses the unique decarbonization challenges facing the South Caucasus, while Vilen Mnatsakanyan focuses on the EU's commitment to renewables and the geopolitical obstacles it faces.

In the final pieces, Gökhan Bafra and İsmail Aykın offer insights into the intersections of energy security and green transformation amid ongoing conflicts, and Lorenzo Somigli highlights the promise of synthetic fuels as a sustainable alternative in energy production.

This issue is a testament to the diverse perspectives needed to address our global energy challenges. From Europe to Asia and the Americas, these contributors provide thoughtful analyses and innovative ideas for a sustainable, secure, and resilient energy future. We invite you to engage with these articles, each shedding light on the crucial crossroads of change, security, and sustainability in energy.

On behalf of Transatlantic Policy Quarterly, I would like to express my gratitude to all the contributors who committed a significant amount of effort and work. Moreover, we are grateful for our Premium Cooparete Sponsor for this issue, Tüpraş. We would also like to thank our other sponsors, TEB and Uluslararası İlişkiler Dergisi for their ongoing support.

Aybars Arda Kılıçer

Editor-in-Chief

Research Article

STRATEGIC AUTONOMY AND ENERGY SECURITY IN THE BALKANS: THE CRITICAL ROLE OF EU INTEGRATION

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This article argues that the energy security of the Balkans is fundamentally dependent on the region's further integration with the European Union. Energy security is conceptualized as strategic autonomy, essential for mitigating the risks of external political influences and coercive leverage, particularly from Russia, which has historically used its energy resources to exert power over European countries. Initially, the concept of energy security will be elucidated within the context of recent global political developments, particularly the invasion of Ukraine by Russia. Subsequently, the current state of energy affairs in the Balkans will be analyzed, highlighting existing challenges and dependencies. Finally, the article will explore potential strategies and avenues, such as Caspian basins and Eastern Mediterranean resources, to enhance the region's energy security and autonomy, emphasizing the critical role of EU integration in achieving these goals.

Amelia Hadfield* & Mustafa Demir**

Keywords: Balkans, Eastern Mediterranean, Energy Security, EU Integration, Strategic Autonomy.

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Summer 2024

Change, Security, and Sustainability in Energy

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** Dr. Mustafa Demir is an Associate Research Fellow at the University of Surrey.

According to the International Energy Agency (IEA), energy security can be defined as "the uninterrupted availability of energy sources at an affordable price" (IEA, 2021). However, in today's interconnected global landscape, this definition extends to include the diversification of energy sources to mitigate the risks associated with overreliance on a single country or supplier. This notion resonates with Winston Churchill's famous dictum: "Safety and security lie in variety and variety alone."

Energy security is not only critical to socioeconomic stability but also essential for maintaining autonomy from external political influences and coercive leverage. In other words, it is fundamentally a matter of sovereignty.[1] This is exemplified by Russia's strategic use of its energy resources to shape relationships and exert power, particularly over European countries, including those in the Balkans. Diversification is, thus, essential to achieve energy security, reduce vulnerability, and enhance resilience against external political influences.

A Look from the Balkans

Given the Balkans' strategic location as the gateway to the European Union, and the fact that some Balkan states are already EU members while others are candidate members, it is evident that the region's energy security is intricately linked to the EU's energy policies and overall security. As history has shown, notably with the event triggering the First World War, the security of the Balkans holds significant implications for broader regional stability. This interdependence has become even more important in the aftermath of the Russian invasion of Ukraine in February 2022.

To provide a comprehensive understanding of the energy security of the Balkans, it is essential to first examine how the European Union is interpreting and responding to its own energy security challenges in the wake of the Ukraine invasion. Subsequently, we will analyze how the EU's energy policy is shaping and affecting the energy security of the Balkans in the aftermath of the Russian invasion of Ukraine. This dual approach will offer a nuanced perspective on the interplay between EU-wide strategies and regional dynamics, highlighting the implications for both the EU and the Balkan states in their quest for a stable and diversified energy supply.

EU's Energy Policy: The Reliance on Natural Gas in the Transition

Considering the rise of right-wing anti-net-zero populism across the West,[2] the

1) (Thaler and Hoffman 2022). See https://www.sciencedirect.com/science/article/pii/S0962629821002390

2) M. Paterson, S. Wilshire and P. Tobin, (2023). "The Rise of Anti-Net Zero Populism in the UK: Comparing Rhetorical Strategies for Climate Policy Dismantling," *Journal of Comparative Policy Analysis: Research and Practice*, 1–19. See https://doi.org/10.1080/13876988.2023.2242799

transition to a zero-carbon economy may take longer than anticipated. Thus, natural gas is expected to play a significant role as a transitional fuel, given its significantly lower emissions compared to coal and oil. Notably, the European Commission has determined that natural gas and nuclear energy power plants can be classified as green energy generators. Consequently, natural gas, alongside nuclear power, is regarded as a sustainable investment, according to the EU.[3] Natural gas is considered a crucial transitional fuel until at least 2050, if not beyond.[4] This designation underscores its importance in bridging the gap between current energy practices and a future dominated by renewable energy sources, providing a reliable and relatively cleaner alternative to other fossil fuels during this period of transition.

In the wake of Russia's invasion of Ukraine in 2022, the European Union has found itself at a critical juncture in redefining both its energy security and foreign policy. The drastic reduction in Russian gas imports from 41 percent in August 2021 to a mere 8 percent by September 2022 underscores this pivotal shift in material terms. However, the EU has also carved out RePowerEU, an ambitious, all-in approach that aligns its energy security firmly within the remit of its foreign and security policy. Is the EU still in the foothills of navigating the complexities of today's European energy landscape, or is it attempting an innovative form of 'multi-level' foreign policy? To explore the consequences of these developments, this Centre for Britain and Europe Briefing Paper delves into the multifaceted strategies employed by the EU.

The first major policy response by the EU to the Russian invasion of Ukraine was its REPowerEU plan set up in May 2022. With its three-pronged strategy of saving energy, producing clean energy, and diversifying energy supplies, the REPowerEU represents an integrated approach aligning technological that aligns technological solutions with geopolitical considerations. Critics would argue that there is little new to the first two goals of energy efficiency and carbon-free energy production, as they essentially align with the overarching goals of the European Green Deal. What is new, however, is the EU's determination to diversify energy supplies, radically redrawing its own energy security composition in terms of both non-fossil fuel use overall, and a gradual shut-off of Russian gas, upending its relations with Russia at a stroke.

Weaning the entire European energy ecosystem off fossil fuels is effectively the end-goal for Europe, decoupling energy producers, industry, business and consumers from oil and gas use in a way that finally aligns with the earliest principles of the EU's climate change commitments, while simultaneously reducing both its material

3) Shashi Kant Yadav, "Natural Gas is a Fossil Fuel, but the EU will Count it as a Green Investment – Here's Why," The Conversion, 4 February 2022. See https://theconversation.com/natural-gas-is-a-fossil-fuel-but-the-eu-will-count-it-as-a-green-investment-heres-why-175867; Catherine Clifford, "Europe Will Count Natural Gas and Nuclear as Green Energy in Some Circumstances," CNBC, 6 July 2022. See https://www.cnbc.com/2022/07/06/europe-natural-gas-nuclear-are-green-energy-in-some-circumstances-.html

4) Hadfield and Demir, (2024).

vulnerability on, and political sensitivity to Russia. In this way, reduced vulnerability equates to enhanced self-sufficiency. This aligns nicely not only with foreign and security goals premised on increasing the strategic autonomy of the EU in key areas, including energy security, but less overall dependence on key strategic partners, including Russia. Another benefit may also be achievable, namely a more coordinated structure of collective energy security amongst the EU Member States, increasingly (and possibly permanently) managed by the European Commission itself. This goal, however, rests entirely upon the sustainability of the first two goals in terms of both energy and foreign policy.[5]

The initial sanctions against Russia driving down imports have arguably begun this process, with a significant net drop in oil and gas purchase, transit and use from Russian sources. However, diversifying the entire EU network, whilst aiming for an eventual sum-total fossil fuel turn-off presents a mammoth challenge; various reports suggest that the shift could not happen before 2050.[6] Diversification may therefore, take on two meanings. First, in terms of preferred suppliers, favoring Norway, Qatar, Azerbaijan, and North and sub-Saharan African suppliers over Russia. Second, in terms of sequencing, reducing oil supplies as a first step, whilst continuing to rely on natural gas, and reducing pipeline gas in favor of LNG supplies or diversifying options, to minimize potential disruption to various energy infrastructures.

Against this backdrop, the EU's efforts to diversify natural gas sources and pipelines, including transition routes, will significantly enhance the energy security of the Balkans. This diversification will contribute to the region's strategic autonomy, reducing its vulnerability to potential Russian meddling and aggression. By investing in the energy infrastructure of the Balkans, the EU is also bolstering its own security, particularly considering the prospective future enlargement of the EU to include Balkan states.[7]

5) Hadfield and Demir, (2024).

6) IRENA, “World Energy Transitions Outlook 2022,”.
See https://www.irena.org/Digital-Report/World-Energy-Transitions-Outlook-2022

7) European Commission, “Enhanced EU engagement with the Western Balkans”. See
https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/enhanced-eu-engagement-western-balkans_en

State of Energy in the Balkan States

Western Balkan countries' typologies of electricity generation

	COAL	HYDROPOWER	RENEWABLES
KOSOVO	95 PERCENT	4 PERCENT	1 PERCENT
ALBANIA	0 PERCENT*	99 PERCENT	1 PERCENT
BOSNIA	63 PERCENT	35 PERCENT	2 PERCENT
NORTH MACEDONIA	75 PERCENT	23 PERCENT	2 PERCENT
MONTENEGRO	42 PERCENT	47 PERCENT	11 PERCENT
SERBIA	70 PERCENT	28 PERCENT	2 PERCENT

(Source: Balkwatch Network cited in Bryza, 2024)

As the above-given table illustrates the heavy reliance on coal for energy production in Balkan countries, with natural gas not yet recognized as a significant transitional fuel towards renewable energy. Lignite coal, the dirtiest type, generates 95 percent of its electricity in Kosovo, which aspires to EU membership. North Macedonia produces 75 percent of its electricity from coal, while Serbia and Bosnia rely on coal for 70 percent and 63 percent of their electricity, respectively. In contrast, Montenegro and Albania utilize less coal and more hydropower. Montenegro generates 43 percent of its electricity from coal, 47 percent from hydropower, and 11 percent from wind and solar. Albania relies on hydropower for 99 percent of its electricity but imports electricity from neighboring countries that primarily use coal-fired plants.[8] Not only non-EU countries in the region, but also some EU members in the region, such as Bulgaria, heavily rely on coal to generate electricity. As of this year, Bulgaria produces more than 40 percent of its electricity from coal.[9]

Serbia is strategically situated in the heart of the region, making it a potential transit country for natural gas to central Europe. At present, the country imports almost all of its gas from Russia, with gas comprising 15 percent of its energy mix. The previous long-term agreement with Gazprom expired at the end of 2021, but in May 2022, a

8) Matthew Bryza, "Western Balkans must pursue more competitive energy sectors," Atlantic Council, 26 February 2024. See https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/western-balkans-must-pursue-more-competitive-energy-sectors/

9) Kate Abnett, "Market economics to cut Bulgaria's coal use before 2038 deadline - minister," Reuters, 15 January 2024. See https://www.reuters.com/sustainability/climate-energy/market-economics-cut-bulgarias-coal-use-before-2038-deadline-minister-2024-01-15/#:~:text=Bulgaria%20produces%20more%20than%2040,including%20nuclear%20energy%20and%20hydropower

new three-year contract was agreed upon.[10]

In 2007, Serbia signed an agreement with Russia, the Comprehensive Energy Agreement facilitated a significant increase in Serbia's energy dependence on Russia, thereby amplifying Russian influence in the Balkans.[11] As implication of this agreement Russia's state-controlled energy giant Gazprom Neft acquired a 51 percent stake in Serbia's national oil company, NIS. This acquisition was part of a broader strategy to control crucial energy assets in Serbia, ensuring a steady flow of investment and modernization into the Serbian energy sector.

The agreement included the commitment to construct part of the South Stream pipeline through Serbian territory. The South Stream was intended to transport Russian natural gas under the Black Sea to Europe via Bulgaria and Serbia, bypassing Ukraine, and was seen as a strategic project for both Russia and Serbia. This pipeline aimed to strengthen Serbia's role as a key transit country for Russian gas. However, the project was later canceled in 2014 due to geopolitical pressures and EU opposition following Russian annexation of Crimea in 2014.[12]

The February 2022 Russian invasion of Ukraine caused the Balkan countries to distance themselves from Russia, including Serbia, which was Russia's most reliable partner in the region. Serbia condemned the invasion and refused to recognize Russia's annexation.[13] However, despite the EU sanctions imposed on Russian energy, Serbia signed a three-year gas supply agreement with Russia in May 2022.[14] This highlights the difficulty of diversifying or weaning the Balkan countries, particularly Serbia, away from Russia without EU support in facilitating bringing in alternative energy sources. The Balkan countries have two options to decrease their dependence on Russian energy: either transition to green energy or replace coal with non-Russian natural gas during the transitional period. In the following section, we will explore alternative options for the Balkans.

Green-Energy

As shown above in the table, the Balkan countries heavily rely on coal to generate power. They will either follow the European way of using a transitional fuel, gas, or will jump to green energy. Transitioning to green energy is the ideal long-term

10) See Bryza, (2024).

11) Reuters, "Serbia, Russia Plan Politically-tinged Energy Pact," 11 December 2007.
See https://www.reuters.com/article/idUSL11870390/

12) Reuters, 11 December 2007.

13) James McBride, "Russia's Influence in the Balkans," CFR, 21 November 2023.
See https://www.cfr.org/backgrounder/russias-influence-balkans

14) RFERL, "Vucic Says Serbia Secures Gas Deal With Russia Following Phone Talks With Putin," 29 May 2022.
See https://www.rferl.org/a/serbia-vucic-gas-deal-russia/31873908.html

goal; however, this shift presents significant cost and logistical challenges, making it gradual. Transitioning to renewable energy sources requires substantial upfront capital investment in infrastructure such as wind turbines, solar panels, and energy storage systems. The economic situation in many Balkan countries is constrained, limiting the availability of funds for such investments.

In the interim, natural gas is a viable transitional fuel due to its lower emissions compared to coal and oil. Given the EU's energy policies and Balkan countries' membership aspirations, the region's strategic importance cannot be overstated. The Balkans serve as a gateway to the EU, and enhancing energy security through diversification, including increased use of natural gas, strengthens their geopolitical significance. This approach aligns with the EU's goals to reduce reliance on Russian energy and bolsters the region's strategic value in EU relations. Consequently, transitioning to natural gas is a geostrategic step that enhances the Balkans' integration with the EU and contributes to regional stability and autonomy.

In light of this context, the following section will examine the region's possibilities and capabilities for obtaining natural gas from alternative sources.

TurkStream: Russia's Trojan Horse in Balkans?

The TurkStream pipeline began its operations in January 2020. Despite its name, the pipeline does not transport Turkish gas; it was designed to transport Russian natural gas across the Black Sea to Türkiye and onward to Southern and Southeastern Europe. This alternative route aims to enhance the security and stability of Russian gas supplies to the region. The Balkan Stream gas pipeline, a continuation of TurkStream, underscores Russia's enduring influence in the Balkans. Inaugurated one year before the Russian invasion of Ukraine, this project was championed by key regional leaders from Türkiye, Bulgaria, and Serbia. Russian energy influence remains significant despite the outbreak of war and subsequent geopolitical tensions. Notably, Russia halted gas supplies to Bulgaria in response to the conflict. However, Bulgarian authorities continued to allow the transit of Russian gas through their territory to Serbia and Hungary. Hungary, an EU member, emerges as the principal consumer of Russian gas in the Balkans, exemplifying how Russian energy strategies continue to penetrate the European Union.[15]

Gas from TurkStream was initially presented as an alternative to Russian gas, purportedly to circumvent sanctions on energy imports from Russia. Until the end of 2019, Gazprom supplied natural gas to the so-called southern direction in Europe, via

15) Dimitar Bechev, "Russia's Energy Clout in the Balkans is on Borrowed Time," Carnegie Politika, 1 December 2023. See https://carnegieendowment.org/russia-eurasia/politika/2023/12/russias-energy-clout-in-the-balkans-is-on-borrowed-time?lang=en

Ukraine and Romania to Bulgaria, Türkiye, Greece and Macedonia. From 1 January 2020, transit started flowing in the opposite direction, coming from Türkiye via the second pipeline of the newly built Turkish Stream. The old route through Ukraine is no longer in use but Gazprom continues to possess its capacity rights. Bulgaria and Greece constructed an interconnector gas pipeline that links the Bulgarian gas network to the Trans-Adriatic Gas Pipeline, which carries gas from Azerbaijan. This connection also enables the transfer of LNG from Greek terminals and the import of LNG via the Balkan Stream. Currently, Bulgaria and Romania are not utilizing the potential of the Trans-Balkan gas pipeline, which was previously used as a route for the transit of Russian gas from Ukraine through Romania to Bulgaria. The Bulgarian authorities plan to reverse the direction of this pipeline and use it to transport gas from Bulgaria to Romania and Ukraine, is known as the Vertical Gas Corridor. This project is a joint venture between the gas companies of Greece, Bulgaria, Romania, Hungary, Slovakia, Moldova, and Ukraine to extend their existing gas connections.[16]

Southern Corridor: Türkiye [TANAP] as alternative to TurkStream

Türkiye is the key transitional route to Azerbaijani gas and Kurdish gas.

Türkiye has the potential to fulfill the energy demands of the Balkan region and Europe as a whole. Although Türkiye itself lacks significant oil and gas resources, it is surrounded by energy-rich neighbors. Iraq boasts 143 billion barrels of oil reserves, with 45 billion in the Kurdish Autonomous Region. OPEC estimates Iran's reserves at 157.5 billion barrels, and Syria has 2.5 billion barrels. Additionally, Azerbaijan has extensive oil reserves for a country of its size, with an estimated 7 billion barrels.

Similarly, when it comes to natural gas, Azerbaijan has proven reserves amounting to 2.6 trillion cubic meters, with additional estimated reserves of around 3 trillion cubic meters.[17] Iran has the world's largest gas reserves, totaling approximately 34 trillion cubic meters. Iraq's proved natural gas reserves total around 3.5 trillion cubic meters, ranking it 12th largest in the world.[18] To put this into perspective, considering the EU's annual natural gas consumption of around 340 billion cubic meters as of 2022, Azerbaijan alone has the capacity to meet the EU's demand for at least 10 years, given its relevant investments and advanced extraction technology already in operation. This suggests that this avenue holds significant promise for facilitating the

16) Krassen Nikolov, "Bulgaria to become main route for Russian gas imports to EU, Ukraine in 2025," Euractiv, 29 February 2024. See https://www.euractiv.com/section/politics/news/bulgaria-to-become-main-route-for-russian-gas-imports-to-eu-ukraine-in-2025/

17) See https://president.az/en/pages/view/azerbaijan/contract#:~:text=Azerbaijan%20possesses%20proven%20gas%20reserves,approximately%203%20trillion%20cubic%20meters

18) Simon Watkins, "Iraq's Untapped Gas Potential: A Turning Point in Global Energy?" 2 January 2024, OIL Price. See https://oilprice.com/Energy/Natural-Gas/Iraqs-Untapped-Gas-Potential-A-Turning-Point-in-Global-Energy.html#:~:text=Iraq's%20proved%20natural%20gas%20reserves,not%20matched%20that%20for%20oil

EU's transition to a sustainable, green economy.

Over the last couple of years. Azerbaijan has supplied increasing amounts of natural gas to the EU (particularly southern and south-eastern Europe) via the Trans-Anatolian Natural Gas Pipeline (TANAP) and the Trans-Adriatic Pipeline (TAP) (Rusi 2022). The Southern Gas Corridor, which is natural gas transportation from the Caspian Sea region via Azerbaijan, Georgia, Türkiye, Greece, Albania, and Italy, became fully operational in late 2020. The EU's strategic diplomatic reengagement with these regions would likely involve reconfiguring its relationship with Türkiye, considering its pivotal geographical position as a potential energy transit route. Linking Iraqi Kurdish gas to the initiatives like the TANAP, which traverses Türkiye, may be an option that presents itself in the medium term (Demir 2019; 2020).

In response to these developments, Serbia is also planning to diversify its natural gas supplies to reduce its dependence on Russia. Belgrade hopes to purchase Azerbaijani gas via the EU-supported Southern Corridor,[19] as it is the Balkan country most exposed to Russian influence due to a combination of historical, cultural, and political factors. Russia has long maintained strong ties with Serbia, leveraging shared Slavic and Orthodox Christian heritage to foster a sense of pan-Slavic brotherhood,[20] which is reinforced through various means, including economic investments, military support, and political alliances.[21]

Despite its past ties with Russia, Serbia has shifted its focus to becoming a transit country for gas supplies to central Europe. This shift became evident in 2023 when Serbia signed an agreement with Azerbaijan to purchase 400 million cubic meters of gas per year from 2024 to 2026, and then agreed to increase the volume to 1 billion cubic meters per year.[22] Facilitating this position of Serbia, a gas interconnection between Bulgaria and Serbia is being constructed and financed by the EU. The given deadline to complete the connection is this year, 2024. That connection further will strengthen Serbia's position as an energy transit country to central Europe.

Serbian Minister of Energy Dubravka Djedovic Handanovic announced this constriction of the interconnection as follows: "After the completion of the Balkan

19) B.F.G. Fabregue, "Interconnector Bulgaria-Serbia: Closer Ties with Azerbaijan and Resilient European Energy Markets," 15 March 2024, Blue Europe. See https://www.blue-europe.eu/analysis-en/short-analysis/interconnector-bulgaria-serbia-closer-ties-with-azerbaijan-and-resilient-european-energy-markets/

20) J. Němec and B. Zorić, (2024). "Friends or Foes within the Pan-Slavic Brotherhood: A Narrative Analysis of Aleksandar Vučić's Stance on Russia's Aggression Against Ukraine", *Nationalities Papers*, pp. 1–16. doi:10.1017/nps.2024.31

21) See https://www.cfr.org/backgrounder/russias-influence-balkans; V. B. Sotirović, "Russia's Balkan Politics: From the Politics of Pan-Slavic Reciprocity of the Tsarist Russia to the "Realpolitik" of the Republic of Gazprom Russia," *Српска политичка мисао*, Vol. 1 (2016): p. 83-109.

22) Milica Stojanovic, "Serbia Signs Natural Gas Deal With Azerbaijan," Balkan Insight, 15 November 2023. See https://balkaninsight.com/2023/11/15/serbia-signs-natural-gas-deal-with-azerbaijan/#:~:text=Currently%2C%20Serbia%20imports%20almost%20all,at%20the%20end%20of%202021

Stream gas pipeline [an extension of TurkStream transporting Russian natural gas from Türkiye to Bulgaria, Serbia and Hungary], which has provided additional security and opened a new direction of supply, we are now achieving the strategic goal of diversifying suppliers and additionally strengthening our position as a transit country for gas supply to Central European countries".

The construction of the Niš-Dimitrovgrad-Bulgaria gas interconnector, which began on 14 January 2022 and was completed in December 2023, represents a concrete step toward reducing key Balkan countries' reliance on Russia and increasing their capacity to resist Russian influence as future EU members. This pipeline, extending approximately 170 kilometres, connects the gas transmission networks of Bulgaria and Serbia. With 109 km on the Serbian side and designed for a maximum pressure of 55 bar, the pipeline has a capacity of 1.8 billion cubic meters per year, covering approximately 60 percent of Serbia's annual gas demand. This project significantly enhances energy security in the region, aligning with the broader EU strategy to diversify energy sources and decrease dependency on Russian gas.[23]

Eastern Mediterranean: Greece as the Key Transition Country

The East Mediterranean region's gas reserves, located in the territorial waters of countries such as Israel, Cyprus, and Egypt, present a significant opportunity. This region, particularly the Leviathan and Tamar fields near Israel, Aphrodite near Cyprus, and Zohr near Egypt, is believed to have substantial natural gas reserves.

Energy Intelligence reports that the Eastern Mediterranean region holds significant gas reserves that could aid in diversifying Europe's gas supply. Israel has identified and tapped into roughly 1 trillion cubic meters (about 35.3 trillion cubic feet) of natural gas. Meanwhile, Cyprus's contingent gas resources are estimated to be between 200 and 400 billion cubic meters. Egypt also possesses considerable gas quantities.

Considering that the EU's gas consumption in 2023 was around 360 billion cubic feet (bcf), harnessing these untapped resources in the Eastern Mediterranean could significantly bolster the EU's efforts to transition to a zero-carbon economy. The potential of these gas reserves, coupled with the region's production capabilities, offers a viable solution for the EU's energy diversification and security needs, playing a crucial role in its sustainable energy transition.

The potential of the East Mediterranean as a gas supplier to the West, including Balkans, hinges on overcoming complex geopolitical, economic, and infrastructural challenges. Pipeline projects, such as the EastMed pipeline, intended to connect these gas fields to Greece and Italy, are under consideration.

23) See B.F.G. Fabregue, 15 March 2024.

In July 2022, Greece energy minister announced that A long-delayed gas pipeline between Greece and Bulgaria aimed at helping Sofia cut its reliance on Russian gas has been completed and can start commercial operations.[24]

The EastMed Pipeline represents a significant opportunity to enhance energy security in the Balkans. As part of the broader strategy to reduce reliance on Russian energy, this pipeline has the potential to diversify energy sources and contribute to the region's stability and economic development.

Egypt's strategic location, coupled with its well-established liquefied natural gas (LNG) facilities, makes it a major player in the export of East Mediterranean gas. In June 2022, the European Union reached an agreement with Israel and Egypt regarding the supply of liquefied natural gas (LNG) to Europe. The agreement allows Egypt to maintain a significant volume of LNG deliveries to the EU. In 2022, 80 percent of Egypt's LNG exports were directed towards Europe, where countries sought alternatives to Russian pipeline gas in the wake of Moscow's invasion of Ukraine. During the 2022/2023 heating season, it is estimated that Egypt exported approximately 4.5 billion cubic meters of liquefied natural gas (LNG) to Europe. There has been a possibility for Israel and Cyprus to route their gas exports to Egypt's LNG plants for liquefaction, followed by shipment.

However, the feasibility of increasing the EU's receipt of LNG from Egypt in the short to medium term is currently under question. According to the Oxford Institute of Energy Studies (OIES), challenges such as tight gas balances and diminished imports from Israel make this prospect challenging to realize. The situation underscores the complexities involved in global energy markets and the intricate balance required to ensure energy security, particularly in the EU's evolving energy needs and geopolitical shifts. Exploiting the energy resources of the Middle East necessitates regional collaboration. Yet, geopolitical tensions, especially those arising from territorial disputes, complicate this endeavor. These challenges need to be navigated carefully to unlock the region's energy potential.

Revitalizing the Middle Eastern energy market has the dual benefit of aiding the EU's efforts to diversify its energy sources and fostering peace in the region. Economic progress and the mutual advantages derived from energy cooperation could help alleviate conflicts. This approach may pave the way for establishing the region as a zone of peace.

Countries in the Middle East are strategically positioned, with many either possessing energy production capabilities or serving as key transit points for energy transport. This unique position underscores the region's potential role as a significant player

24) Reuters, "Greece says gas link with Bulgaria completed, can start operation this month," 6 July 2022. See https://www.reuters.com/business/energy/greece-says-gas-link-with-bulgaria-completed-can-start-operation-this-month-2022-07-06/

in the global energy market, offering opportunities for both energy exports and facilitating the transit of energy resources.

LNG Terminals

Expansion of LNG (liquefied natural gas) terminals. Increasing the number of LNG terminals would enable the Balkans to diversify its energy sources, thereby reducing dependence on Russian gas supplies. Establishment of additional LNG terminals would facilitate the import of natural gas from a variety of global suppliers, enhancing the region's energy resilience. This is particularly important in the context of the EU's ongoing efforts to transition to a zero-carbon economy, where natural gas is expected to play a significant role as a transitional fuel due to its lower emissions compared to coal and oil.

Concluding Remarks

The energy security of the Balkan region is crucial for several compelling reasons. From a European perspective, ensuring this security hinges on the operation and reliability of routes that transport Azerbaijani and Kurdish gas through Türkiye. This strategy is integral to reducing the region's dependence on Russian energy supplies. Conversely, from a non-European perspective, a failure to diversify energy sources risks the Balkans becoming a vassal region under Russian influence, threatening the region's energy security and the foundational principles of the liberal democratic European Union.

Historically, the Balkans have been a hotspot for significant geopolitical events, such as the assassination that triggered the First World War, highlighting the region's susceptibility to external meddling. Today, reducing Russian influence remains essential for stabilising the area. As the global community transitions towards a carbon-free economy, natural gas, particularly Liquefied Natural Gas (LNG), has become a critical transitional fuel in Europe. The EU's strategic objective drives this shift to reduce reliance on Russian gas through source diversification.

The Balkans serve as a crucial conduit for alternative energy supplies, particularly natural gas, to the southeastern flank of the European Union, including Ukraine. Establishing a diversified energy network that connects Azeri gas and potential contributions from Kurdish and Iraqi sources is vital for diminishing Russian leverage over the region's energy markets.

Reducing dependency on Russian energy and halting Russian leverage are also considered implicit prerequisites for EU membership for Balkan states like Serbia and

Bosnia. To achieve this, the region must explore various alternative energy sources, including: The Southern Gas Corridor, Supplies from the Eastern Mediterranean via Greece, and Liquefied Natural Gas (LNG) terminals.

In this context, Türkiye and Greece play a strategic and geopolitical role in the energy security of the Balkans. The construction of the Niš-Dimitrovgrad-Bulgaria gas interconnector, completed in December 2023, exemplifies a concrete step toward reducing key Balkan countries' reliance on Russia and enhancing their capacity to resist Russian influence.

Research Article

ENERGY SECURITY IN THE BLACK SEA: BENEFITS OF A COOPERATION BETWEEN ROMANIA, BULGARIA, AND TÜRKİYE

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Türkiye, Bulgaria, and Romania can formalize a distinct, trilateral energy space, a supplier of energy and energy security for the southeastern European area, and for the EU, the territory can become an extended energy hub in the field. These countries have significant primary energy resources of their own (exploration-exploitation), but the essential advantage is given by their geographical and infrastructural proximity to the Middle East, which plays a significant role in global energy issues. The extended energy hub concept can offer the potential for mutual collaboration, regional energy security and sustainable connectivity with other major energy resource providers regionally and globally.

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Energy security in the Black Sea is a matter of strategic importance both for the countries in the region and for the EU and NATO, since the Black Sea is a strategic crossroads between Europe, the Middle East, and Asia. Still, it is also a dense area with frozen and "unfrozen" conflicts.

In the light of the current global context, energy security is a subject of much debate. It is influenced by political, economic, geopolitical, theoretical, and scientific facts, bearing in mind the significant oil and gas reserves that the states in the region possess and the critical energy transport routes that run through the Black Sea countries.

The concept of "energy security" implies the maintenance of a reliable and sustainable energy supply, including electricity, natural gas, petroleum products and other energy sources. The goal is to ensure permanent access to energy resources, to operate and develop the infrastructure and production capacity needed to use them efficiently.

For ensuring energy security, the representative institutions in the energy-related areas must implement measures that indicate an unified and consistent strategy with the main aim of i) diversifying energy sources (e.g. oil or natural gas) in order to reduce dependency on a single source, ii) increasing energy independence through the development of domestic production resources such as cogeneration, renewable energy and improving energy efficiency, iii) improving energy infrastructure, including transmission and distribution networks, so as to ensure better and safer access to energy, iv) increasing the storage capacity of electricity, natural gas and of petroleum products, in order to prevent supply disruptions, v) forging international partnerships to reduce dependence on suppliers of energy, natural gas or petroleum products from a single region or country, vi) improving the energy infrastructure's cybersecurity to prevent cyberattacks.

Key Aspects of the Energy Security in the Black Sea

To understand the debated concept, it is necessary to seek answers regarding the definition of the term "threat". Thus, according to Paul Robinson's "Dictionary of International Security" (C&A Publishing, Cluj-Napoca, 2010) the term is defined as follows: "From the perspective of national security, the threat is someone or something that has the potential to harm national interests. Theoretically, the Security policy should be inferred from threat analysis, which would lead to appropriate responses to reduce the harm that such threats cause.".

Risk is the possibility of facing danger. In the area of energy security, the possibility of such situations arising lies in the extraction area and transport territories. Risky situations that we may encounter are technical failures or commercial misunderstandings that lead to a decrease or a halt in energy flow.

Another relevant concept in the process of understanding energy security is vulnerability, as it is the sore point of someone or something. For example, all the states that were getting supplied or continued to get supplied (e.g. Hungary, Slovenia) with gas through pipelines that cross Ukraine were vulnerable in the context of the internal political or foreign policy turmoil that the Ukrainian state faced.

To ensure regional security, the principle of "collective defense" needs to be implemented, a concept which is based on voluntarism, selectivity, openness, permissiveness, legal basis, legitimacy and deterrence of threats. In order to achieve the expected results, states need to benefit from the theoretical support of energy policies, strategies and legislation.

However, we notice that, in most cases, at national level, states reserve their right to act according to their own interests, given the interdependence relation between energy security and national security. They often seek to meet their individual needs at the expense of participating in joint efforts.

Starting from the principle of collective security, EU member states, NATO countries, but also former USSR member states in the Caucasus - Caspian Sea area have developed common medium- and long-term energy strategies. We can conclude that we are witnessing a new trend in the field of international relations, as they have realized the importance of energy and the fact that energy is now a bargaining chip and a factor of risk for national and, at the same time, regional security. If we look at the events that have marked the international arena, we can consider that energy security is interdependent on economic security, as well as the security of each state's own infrastructure.

If we bring to the fore Romania, Bulgaria and Türkiye, we can say that the three states have access to considerable resources/reserves of oil and natural gas in the Black Sea, to new opportunities for exploitation. For example, Romania's Neptun Deep perimeter is critical to reducing dependence on foreign energy imports.

The Black Sea is a critical hub for energy transport between Europe, Asia and the Middle East. The South Stream, Turkish Stream and TAP (Trans Adriatic Pipeline) natural gas pipelines are vital for the diversification of supply sources and for the European energy security.

Liquefied Natural Gas (LNG) terminals in Türkiye and other coastal states offer additional supply alternatives.

The region, however, is marked by geopolitical tensions between the Russian Federation and NATO member countries. Russia is using energy as a tool of political influence, affecting Europe's energy security by controlling some routes and reserves.

Infrastructure projects, such as alternative pipelines to the Russian ones, are crucial to reduce dependence on Russian gas and increase the energy security of the countries

in the region and the entire European continent.

Collaboration between the countries bordering the Black Sea and their international partners is a significant reality. Regional initiatives, such as the Organization of the Black Sea Economic Cooperation (BSEC), contribute to the development of common policies for energy security.

We see an important role for the EU and NATO in supporting energy projects and ensuring stability in the region.

Investments in renewable energy sources (wind and solar energy) ensure diversification of the energy mix and reduction of dependence on caustobiolytic fossil resources.

Romania and Bulgaria, for instance, have significant potential for the development of offshore wind farms in the Black Sea.

However, political instability and conflicts in the region can threaten energy infrastructure and investment projects.

Dependence on energy imports from Russia remains a major concern for the countries in the region.

It is well known that uneven regulations and legislative framework can often discourage foreign investment. We see that there are initiatives and strategies for energy security in the area. What the European policy does not include, however, is a developed infrastructure that would be a relevant element in increasing competition in the gas market and diversifying supply sources, which are the basis for increasing supply security. Caspian gas sources would be an opportunity for the European Union to increase the security of energy supply and a chance to lower sale and transport prices. Given that some elements indicate risks associated with the extraction areas, the territories on which the gas transport systems (pipelines, pumping stations, storage tanks) could be built are quite unstable politically, which may be why the EU has not yet decided. At the same time, there are question marks over the sources of supply of the two supply corridors envisaged by the EU. Possible options may be Turkmenistan, Kazakhstan, with significant extraction basins, but these cost more because a pipeline running under the Caspian Sea would have to be built, and last but not least Azerbaijan, whose Shah Deniz extraction basin is only 70km away from the Caspian coast.

However, discovering new deposits and developing transport infrastructure offer positive prospects for energy security.

Regional and international cooperation can bring particular benefits, including through the trilateral Romania – Bulgaria – Türkiye commitment, and the transition to green energy and investments in renewable sources contribute to a more sustainable

energy security in the area.

The diversification of energy sources through local exploration and production, together with bilateral and multilateral cooperation agreements, triggers commitments to develop energy infrastructure (pipelines and terminals, interconnections, offshore wind energy, solar and other renewable sources).

However, energy infrastructure resilience and security requirements (critical infrastructure protection, crisis responses, harmonization of regulations) prove themselves to be of date.

Energy Security in Romania

A country's energy security is a vital component of its national security doctrine. Given the country's strategic position in the region and its significant natural resources (diversified energy mix, investments in infrastructure, integration of renewable energy sources and reduction of dependence on imports), energy security in Romania is of major interest.

From Romania's perspective, energy security is a relevant element in ensuring national security, and the country's geostrategic positioning causes both challenges and impediments. On the one hand, as Romania is on the periphery of the European Union, logistical and operational integration with developed countries is much more difficult to be achieved, requiring constant and joint efforts. On the other hand, Romania is close to energy sources, such as the Caucasus and the Middle East, which determines its regional relevance. Nevertheless, Romania still has much to invest in developing energy security, requiring a development and update of the legislative framework, a transformation of standards in line with the principles promoted at European level and an increase in the resilience of energy systems.

Romania is one of Eastern Europe's largest oil and gas producers (reserves in the Black Sea continental shelf in the Neptune Deep perimeter).

The use of coal is declining due to environmental policies, but it still plays a role in the energy mix.

There is potential for wind, solar, and hydro energy (the wind farms in Dobrogea are among the largest in Europe).

The natural gas transmission system is well developed, with interconnections to European networks (BRUA / Bulgaria – Romania – Hungary – Austria).

There is diversified electricity production capacity, coal, natural gas, hydropower plants and the Cernavodă nuclear power plant.

Energy efficiency programs involve the thermal rehabilitation of residential and

public buildings.

Projects to interconnect gas and electricity networks with those of the neighboring countries contribute to security of supply and increased resilience to crises.

The supply agreements for natural gas from various sources involve LNG (from the USA) or natural gas (from Azerbaijan).

The challenges are linked to the instability in the region (tensions with Russia may affect the security of energy supply given the dependence on Russian natural gas), and delaying investments in the energy infrastructure and renewable sources may limit Romania's capability to ensure its energy security in the long term.

The opportunities relate to discovering new hydrocarbon reserves in the Black Sea and other areas and adopting advanced technologies in energy production and distribution.

Energy Security in Bulgaria

Bulgaria is making efforts to diversify energy sources, modernize infrastructure and integrate renewable energy to ensure its long-term energy security.

The country has significant lignite reserves, which are used mainly in thermal power plants. However, the use of coal is declining due to environmental policies and the energy transition.

Bulgaria's hydropower potential and limited oil and natural gas reserves make it dependent on imports, particularly from Russia.

The Kozloduy Nuclear Power Plant is a conclusive component of the national energy system, with plans for the construction of a new nuclear power plant in Belene being currently assessed.

Bulgaria is a strategic hub for natural gas transport with links to Russia, Greece and Türkiye networks. The IGB (Interconnector Greece-Bulgaria) project is essential for diversifying natural gas sources.

Investments in wind, solar and bioenergy are on the rise, and projects for interconnection with gas and electricity networks in neighboring countries (IGB and the interconnector with Romania) are significant in the area.

Energy Security in Türkiye

This is a matter of strategic importance given Türkiye's unique geographical position between Europe and Asia, as well as its role as a transit hub for energy resources.

Significant natural gas deposits have recently been discovered in the Black Sea (Sakarya field) and the use of coal raises concerns about the environmental impact.

Türkiye has significant potential for increasing the results obtained in the wind, solar and hydro energy fields.

Türkiye is a transit country for the natural gas and oil pipelines connecting resources from Central Asia, Russia, and the Middle East to Europe (Turkish Stream and TANAP / Trans-Anatolian Natural Gas Pipeline).

The country is developing nuclear power plants (in Akkuyu), is increasing the share of renewable sources in its energy mix, is investing in the modernization and expansion of energy transmission and distribution networks and is developing interconnection projects with energy networks in neighboring countries.

Türkiye imports natural gas from various sources, including Russia, Azerbaijan, Iran and Qatar, and invests in LNG infrastructure to ensure flexibility of supply.

The country is often vulnerable to price fluctuations and geopolitical tensions, and regional conflicts and differences with neighboring countries may affect supply and energy stability security.

Romania – Bulgaria – Türkiye Energy Cooperation

Energy cooperation between Romania, Bulgaria and Türkiye is an essential component of the energy strategies of each country involved.

1. The basic direction of cooperation relies in the Interconnection of gas and electricity networks: the BRUA project, the interconnection of the three countries' electricity networks, facilitating energy exchange and ensuring the stability of energy systems.

2. Cooperation for the exploration and exploitation of energy resources: agreements of connections between exclusive economic zones with the trilateral approach of joint projects for the exploration and extraction of natural gas and oil in the Black Sea, development of common capacities of renewable energy sources, exchange of knowhow for the transition to a green economy.

3. Romania, Bulgaria and Türkiye can work together to diversify energy sources and reduce dependency on a single supplier (e.g. targeted import and development of LNG terminals and other critical infrastructure).

4. Energy security is the overriding result of regional collaboration (given external threats, energy market fluctuations, establishment of an integrated energy market, sharing of information and resources, common strategies to respond to energy crises).

5. Equally, effective cooperation requires harmonizing energy regulations and policies and reducing administrative barriers.

6. Joint research and development programs for new technologies and energy efficiency bring benefits for the three countries, focusing on at least three segments: 1) BRUA Pipeline (for the transport of natural gas through Romania and Bulgaria to other European countries), 2) Black Sea Oil & Gas (joint exploration and exploitation of the Black Sea resources), 3) joint investments in renewable energy.

7. Joint projects may include developing and implementing new energy storage technologies (advanced batteries and long-term storage solutions), smart grids, green hydrogen, carbon capture and storage.

8. Universities and research institutes in Romania, Bulgaria and Türkiye can work together to develop joint educational programs in the field of energy, training and professional growth, exchange of knowledge and good practices.

9. Trilateral cooperation can help reduce dependence on energy imports from geopolitically unstable or unreliable sources, contribute to regional stability and prosperity, strategic partnerships can reduce geopolitical tensions.

10. The involvement of civil society (NGOs and local communities) coupled with public-private partnerships (PPPs) can mobilize the efforts to develop the energy infrastructure and implement innovative projects. Governments are urged to work with private companies to achieve common goals.

Benefits of Trilateral Cooperation

The trilateral cooperation between Romania, Bulgaria and Türkiye in the energy field positively impacts energy security, economy, the environment and regional stability.

1. Joint energy security (diversification of sources, infrastructure resilience) and the interconnection of gas and electricity networks between the three countries ensure flexibility and responsiveness to emergencies or energy crises.

2. Economic benefits relate to cost reduction, attracting investments, creating jobs.

3. Joint research and development projects ensure the transfer of knowhow and environmental protection.

4. Regional stability and integration are improved through the development of

bilateral and regional relationships, integration into the European and global energy market.

5. The most important benefit is the social impact and community development (access to energy, community involvement). There are multiple benefits of trilateral cooperation between Romania, Bulgaria and Türkiye in the energy field. This increases energy security, reduces costs, and stimulates technological innovation, protects the environment, and strengthens regional stability. The involvement of all relevant actors and an integrated approach are essential to make full use of these benefits and ensure a sustainable energy future for the region.

6. It is recognized that the trilateral approach increases the negotiating capacity on international market, access to new markets, stimulates competitiveness, and economy on a large scale.

7. Enhancing the safety and reliability of energy grids (resilience, coordination in crisis management) are stemmed from cross-border projects through the development of energy corridors.

The trilateral partnership can serve as a model of regional cooperation, attracting interest and support from other countries and international organizations for joint energy projects.

The active involvement in global and regional initiatives, such as the European Green Deal, can bring additional benefits and position the three countries as regional leaders in the energy transition.

Concluding Remarks

Energy resources are distributed unevenly, causing regional and international power to be unbalanced. Most of the resources in Eurasia are located on the territory of the Russian Federation and in the Caspian Sea.

Cooperation and achieving a high level of convergence of efforts are two of the most important tools actors use to ensure their security and the necessary framework for development.

At European level, energy security will see new developments and will be one of the main elements that will define trade and environmental policies.

The transited territories and states represent the risk of transportation. The economic power, the political administration and the level of the population's technical education, the economic circuits and the borders crossed, as well as the infrastructure are determining factors when choosing transportation routes and price.

The energy cooperation between Romania, Bulgaria and Türkiye is a crucial element for the region's energy security and stability and for Europe's energy security as a whole. This requires continued investment in infrastructure, common regulations and an integrated strategic approach in order to exploit each country's energy potential fully.

Trilateral collaboration, investments in infrastructure and alternative energy sources are essential for ensuring a stable and sustainable energy supply in this strategic region.

By adopting coherent strategies and through a trilateral cooperation between Romania, Bulgaria and Türkiye, the Black Sea region can become an important aggregated hub for the European and global energy security.

Trilateral energy cooperation between Romania, Bulgaria and Türkiye has many benefits, ranging from enhanced energy security and cost reductions to boosted technological innovation and environmental protection.

This cooperation implies developing an integrated and competitive regional energy market capable of responding to current and future challenges.

By adopting a strategic and coordinated approach, the three countries can fully capitalize on the potential of an energy cooperation, thereby ensuring a sustainable and prosperous energy future for the entire region.

Research Article

TRANSATLANTIC REGION: WHERE ENERGY SECURITY MEETS GREEN TRANSITION IN A GEOPOLITICALLY TURBULENT WORLD

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This study provides an analysis of the pathways through which the landscape of Transatlantic energy security has been changing. These pathways are marked by recent geopolitical crises and two outstanding challenges: strengthening energy security and achieving the green transition. The Ukraine war and rising tensions in the Middle East have once more demonstrated how fragile global supply chains are due to their dependence on Russian natural gas and reliance on oil from the Middle East. These crises have brought up the urgent need for energy diversification, with renewable energy being at the center and a strategic means of reducing geopolitical risks in this context. It also analyses how the recent developments have redefined the Transatlantic region's energy-related perspectives, especially how the United States and the European Union cooperate to ensure energy supplies while accelerating the transition toward sustainable

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Energy security and green transition are currently two of the most urgent challenges in many countries of the Transatlantic region. In this regard, climate change and dependence on fossil fuels have prompted the transatlantic drive toward a low-carbon economy in recent years, especially on the European side. Yet all these efforts are being stretched out simultaneously in an increasingly unstable geopolitical environment with increased tensions, wars, conflicts, and trade disruptions that may destabilize the world energy markets.

The Russian invasion of Ukraine, the sanctions against significant exporters of fossil fuels, and the disruption of critical material supply chains have put up the vulnerabilities that are always part of traditional energy systems. These geopolitical crises have also brought the importance of a more resilient and diversified energy portfolio that meets near-term energy security needs and accelerates the transition toward sustainable renewable energy sources.

In the meantime, the Middle East is affected by the current conflicts, such as the Israel-Hamas conflict, that threaten the stability of the regions with rich oil reserves and, thus, the global energy supply. Given the significant role of the Middle East in the global oil market, any disruption in this region has the potential to escalate and impact the global energy market. These crises, resulting in volatility in oil prices, highlight the urgent need for all countries to reduce their dependence on fossil fuels by shifting towards renewable energy sources.

Put together, these crises sharpen the focus toward energy diversification and the development of a resilient and sustainable energy infrastructure in the Transatlantic space. Now more than ever, nations should balance preserving near-term energy security and accelerating the green transition. Indeed, only some issues are pressing the international community more urgently than how to secure energy supplies during crisis periods without turning back to climate-harming policies.

Accordingly, this study responds to twin challenges that puzzle energy security and simultaneously manage the green transition at the Transatlantic level in the face of growing geopolitical instability. The discussion will range from diverse pathways toward supply security and fluctuating geopolitical power dynamics in the age of renewables through international cooperation to emphasize a safe and sustainable energy future. Understanding this unpredictable interplay of forces will make the navigational path to a more resiliency-secure and sustainable global energy system easier.

The Importance of Energy Diversification

The global energy outlook has been considerably altered in the 21st century. Herewith, the concept of energy security has evolved to become multidimensional, as opposed to the traditional perspective that focuses on the security of supply.[1,2] According to the traditional perspective, energy security is limited to the availability and reliable supply of fossil fuels from stable sources. Recent geopolitical tensions have emerged to demonstrate such approaches as fragile and accelerated the need to diversify the energy supply, highlighting the role of renewable energy sources.

Among the essential takeaways from the recent geopolitical situations around the world, like what has been happening with Ukraine and the ongoing war, is that energy supply chains can easily be at the mercy of political instability. Following the invasions of Ukraine in 2022, for instance, the EU was found to be deeply reliant upon Russian natural gas, where more than 40 per cent of its imports emanated from Russia.[3] In turn, setting sanctions against Russia and the action that Russia took against Europe became an extreme energy crisis that exposed the risk caused by over-dependency on one supplier.[4]

However, this crisis also highlighted the necessity to diversify energy sources, both in terms of the type of energy used and the geographical locations of suppliers. It has become more evident in the recent case of Europe with Russia that dependence on a few key suppliers, irrespective of geographical proximity and political orientation, presents a risk to energy security.[5]

Accordingly, immediately after the conflict, Europe tried to find alternative energy sources. The EU then proposed a series of emergency measures, including an ambitious REPowerEU plan, formulated to gradually reduce the EU's dependence on Russian fossil fuels by diversifying supply chains and speeding up the deployment of renewable energy.[6] For instance, LNG imports from the U.S. and Qatar increased,[7] and

1) D. Yergin, Ensuring Energy Security. *Foreign Affairs*, Vol. 85, No. 2 (2006): p. 69. See https://doi.org/10.2307/20031912

2) For more details, see D. Yergin, *The Prize: The Epic Quest for Oil, Money, and Power* (New York: Free Press, 2008).

3) European Council. (2024a, March 21). "Where does the EU's gas come from?" Retrieved on 14 September 2024. See https://www.consilium.europa.eu/en/infographics/eu-gas-supply/

4) European Council. (2024b, September 30). EU sanctions against Russia explained. Retrieved on 14 October 2024. See https://www.consilium.europa.eu/en/policies/sanctions-against-russia/sanctions-against-russia-explained/

5) J. Jedrych, "The EU Needs Alternatives to Russian Energy. Here's the Plan," Council on Foreign Relations, 13 December 2022. Retrieved on 14 October 2024. See https://www.cfr.org/in-brief/eu-needs-alternatives-russian-energy-heres-plan

6) European Commission, "REPowerEU: Affordable, secure and sustainable energy for Europe," 18 May 2022. See https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

7) A. Loskot-Strachota, U. Keliauskaite and G Zachmann, "Future European Union Gas Imports: Balancing Different Objectives," Bruegel, 3 July 2024. See https://www.bruegel.org/analysis/future-european-union-gas-imports-balancing-different-objectives

in the short term, European countries burned more coal to avoid blackouts.[8] However, this response stressed the importance of the political balance governments will have to walk between energy security and standing true to commitments to climate change.

Renewable energy, such as wind, solar, and traditional hydropower, uniquely enhances energy security by reducing reliance on imported fuels. In contrast to fossil fuels, the supplies of which are often concentrated regionally and primarily under unstable political regimes, renewable energy resources are available globally. This availability enables almost every country, in one way or another, to derive substantial energy supplies from indigenous renewable sources and thereby reduce its vulnerability to external disruption.

The European Green Deal, for example, aims to make the EU climate-neutral by 2050 and strongly emphasizes enhancing energy security by increasing renewable energy production.[9] Investing in wind, solar, and hydrogen technologies would help the EU break its dependence on energy supplies often linked to geopolitical risks. In this respect, renewable energy forms an indispensable building block of a low-carbon supply of diversified energy sources.

Switching to a more diversified energy portfolio based on renewable sources is full of challenges. The main problem is that, unlike fossil fuels, renewable energy, especially wind and solar, is intermittent, depending on weather conditions.[10,11,12] Therefore, countries should be willing to invest in emerging technologies related to renewable energy development, modernize their energy grids and improve interconnection with neighboring states.

Cross-border interconnections stabilise renewable energy supply by transferring surplus electricity from one region to another with higher demand.[13,14,15] Indeed, in

8) Eurostat, "Coal Production and Consumption Up in 2022," 22 June 2023.
See https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230622-2

9) European Commission, The European Green Deal: Striving to be the First Climate-Neutral Continent, 2019.
See https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

10) K. Van Der Wiel, L. Stoop, B. Van Zuijlen, R. Blackport, M. Van Den Broek and F. Selten, "Meteorological Conditions Leading to Extreme Low Variable Renewable Energy Production and Extreme High Energy Shortfall," *Renewable and Sustainable Energy Reviews*, Vol. 111 (2019): p. 261–275. https://doi.org/10.1016/j.rser.2019.04.065

11) S. Mosquera-López and J. M. Uribe, "Pricing the Risk due to Weather Conditions in Small Variable Renewable Energy Projects," *Applied Energy*, Vol. 322 (2022): p. 119476. https://doi.org/10.1016/j.apenergy.2022.119476

12) R. Meenal, D. Binu, K. C. Ramya, P. A. Michael, K. V. Kumar, E. Rajasekaran and B. Sangeetha, "Weather Forecasting for Renewable Energy System: A Review," *Archives of Computational Methods in Engineering*, Vol. 29, No. 5 (2022): p. 2875–2891. https://doi.org/10.1007/s11831-021-09695-3

13) G. Escribano, C. González-Enríquez, L. Lázaro-Touza and J. Paredes-Gázquez, "An Energy Union without Interconnections? Public Acceptance of Cross-Border Interconnectors in Four European Countries," *Energy*, Vol. 266 (2022): p. 126385. https://doi.org/10.1016/j.energy.2022.126385

14) R. Poudineh and A. Rubino, "Business Model for Cross-Border Interconnections in the Mediterranean Basin," *Energy Policy*, Vol. 107, (2017): p. 96–108. https://doi.org/10.1016/j.enpol.2017.04.027

15) L. M. Abadie and J. M. Chamorro, "Evaluation of a Cross-Border Electricity Interconnection: The Case of Spain-

2022, the EU launched a revised Trans-European Networks for Energy action plan and regulation to increase interconnectivity between states, allowing it to utilise its base of renewable energy resources efficiently.[16] This action plan become especially relevant in the context of enhanced reliance on renewable energy sources by countries requiring flexibility and integration in this grid due to the instability of energy generation.

Although renewable energy is the key to the goal of long-term energy security,[17,18] many countries across the Transatlantic region face the need for a variety of energy mixes during this period. Nuclear energy, for example, has gained attention since it constitutes a low-carbon and stable source that complements renewable energy supply in the energy transition.[19,20] Therefore, France represents an excellent example of how nuclear energy, which currently generates more than 70 percent of the country's electric power, could balance energy security with reducing carbon emissions.[21]

Apart from nuclear, natural gas supplies - particularly in liquefied form, LNG - are seen as a transition fuel.[22,23] Natural gas is a fossil fuel but produces much less CO^2 emissions than coal and oil.[24] The U.S. - now the biggest exporter of LNG globally - has also increased its supplies to Europe to compensate for the shortfall caused by a steep fall in Russian gas supplies.[25] This changeover will demonstrate how LNG can be crucial to stabilizing energy supplies while transitioning to an entirely renewable energy system.

France," *Energy*, Vol. 233, (2021): p. 121177. https://doi.org/10.1016/j.energy.2021.121177

16) European Commission, "Trans-European Networks for Energy: EU Policy for Planning Cross-Border Energy Infrastructure," (June 2022).Retrieved on 14 October 2024. See https://energy.ec.europa.eu/topics/infrastructure/trans-european-networks-energy_en

17) K. Khan, C. W. Su, A. Khurshid and M. Qin, "Does Energy Security Improve Renewable Energy? A Geopolitical Perspective," *Energy*, Vol. 282 (2023): p. 128824. https://doi.org/10.1016/j.energy.2023.128824

18) S. V. Valentine, "Emerging Symbiosis: Renewable Energy and Energy Security," *Renewable and Sustainable Energy Reviews*, Vol. 15, No. 9 (2011): p. 4572–4578. https://doi.org/10.1016/j.rser.2011.07.095

19) Q. Wang, J. Guo, R. Li and X. Jiang, "Exploring the Role of Nuclear Energy in the Energy Transition: A Comparative Perspective of the Effects of Coal, Oil, Natural Gas, Renewable Energy, and Nuclear Power on Economic Growth and Carbon Emissions," *Environmental Research*, Vol. 221, (2023): p.115290. https://doi.org/10.1016/j.envres.2023.115290

20) M. Mathew, "Nuclear Energy: A Pathway Towards Mitigation of Global Warming," *Progress in Nuclear Energy*, Vol. 143 (2021): p. 104080. https://doi.org/10.1016/j.pnucene.2021.104080

21) World Nuclear Association, "Nuclear Power in France," 21 May 2024. Retrieved on 14 October 2024. See https://world-nuclear.org/information-library/country-profiles/countries-a-f/france

22) C. Gürsan and V. De Gooyert, "The Systemic Impact of a Transition Fuel: Does Natural Gas Help or Hinder the Energy Transition?" *Renewable and Sustainable Energy Reviews*, Vol. 138 (2020): p. 110552. https://doi.org/10.1016/j.rser.2020.110552

23) R. F. Aguilera and R. Aguilera, "Revisiting the Role of Natural Gas as a Transition Fuel," *Mineral Economics*, Vol. 33, No. 1–2 (2019): p. 73–80. https://doi.org/10.1007/s13563-019-00192-5

24) R. J. Kuhns and G. H. Shaw, "Coal and Natural Gas," in *Navigating the Energy Maze: The Transition to a Sustainable Future* (Cham: Springer, 2018).

25) International Gas Union. "2024 World LNG Report," (2024). Retrieved on 14 October 2024. See https://www.igu.org/resources/2024-world-lng-report/

While the conflict in Ukraine most directly affected natural gas markets, recent tensions in the Middle East have been putting pressure on international oil supplies. The escalation of conflict between Israel and Hamas- and ongoing turmoil in other nations such as Iran and Syria- has raised concerns that supply disruptions in oil production and transport could occur.[26],[27] The Middle East remains one of the world's most important sources of oil supplies, accounting for about 30 percent of total global production.[28] Any conflict that challenges the stability of the oil-rich countries or the security of crucial transport routes-as a sample, the Strait of Hormuz-would have dramatic impacts on world energy prices.

The geopolitical turmoil of recent years has gone a long way in making clear that energy diversification is a necessity rather than a choice for energy security. As important as renewable energy will be at the heart of such energy diversification, one completed with modernized grids, energy storage, and complementary low-carbon technologies-including nuclear and LNG-will be required to build a resilient energy system. Most of all, the Transatlantic region can lead the way during this transformation and serve as a good example of how energy security might look when combined with green transition in today's world, facing growing volatility.

Geopolitics of Green Transition

The green transition will redefine economies and geopolitics. Conventionally, countries like Saudi Arabia and Russia, which are well endowed with fossil fuel resources, enjoy high geopolitical power since they control global energy supplies.[29,30] That is rapidly changing. The world is turning toward renewable energy. New players in the global energy marketplace are emerging as countries rich in renewable resources, including wind and solar, develop.

During the New Energy era, countries with the most favorable solar and wind climatic conditions would rise to prominence. For instance, Denmark rose to global leadership in wind energy and created new geopolitical alliances based on renewable energy competence. It was made possible through the Danish government's investment in

26) A. Chu, J. Smyth and T. Wilson, "Oil Prices Climb as Iran Missile Attack Prompts Supply Fears," Financial Times, 2 October 2024. Retrieved on 14 October 2024. See https://www.ft.com/content/6ce80cfd-19f9-4798-9980-a57cbfe87c35

27) A. Cornwell, M. Spetalnick and J. Saul, "Countdown to Middle East War? How the Region can step back from the Brink," Reuters, 4 October 2024. Retrieved on 14 October 2024. See https://www.reuters.com/world/middle-east/countdown-middle-east-war-region-can-step-back-brink-2024-10-04/

28) Energy Institute. "72nd Statistical Review of World Energy," (2023). Retrieved on 15 October 2024. See https://www.energyinst.org/__data/assets/pdf_file/0004/1055542/EI_Stat_Review_PDF_single_3.pdf

29) M. Bradshaw, T. Van De Graaf and R. Connolly, "Preparing for the New Oil Order? Saudi Arabia and Russia," *Energy Strategy Reviews*, Vol. 26 (2019): p. 100374. https://doi.org/10.1016/j.esr.2019.100374

30) M. Blondeel, M. J. Bradshaw, G. Bridge and C. Kuzemko, "The Geopolitics of Energy System Transformation: A Review," *Geography Compass*, Vol. 15, No. 7 (2021). https://doi.org/10.1111/gec3.12580

both the technology and infrastructure of wind energy, making it a net exporter of wind power technologies and know-how and, thus, a country to be given the leading role in the green energy revolution.[31]

The same thing could be said regarding how the countries in the Transatlantic region, particularly the United States and parts of Europe, would seek to use their indigenous resources and technology know-how to their advantage in leading the green transition. For example, the U.S. invests heavily in solar power, and states like California and Texas have become pivotal players in producing solar energy.[32] It is about technology and creating a new geopolitical order based on sustainable energy resources.

Countries can now become more energy-independent and not depend too much on oil, coal, and other fossil fuels. In the process, increased energy independence decreases their vulnerability to external economic energy shocks caused by geopolitical conflicts, which may be observed from the current crisis in Ukraine. Germany, for instance, has a policy supporting the green transition called Energiewende, designed to make the country less dependent on imported energy and, at the same time, less vulnerable to geopolitical blackmail.[33] Germany is working on becoming a more self-sufficient energy actor by investing in wind, solar energy, and, recently, hydrogen.

As green energy starts to take center stage in global energy systems, countries already investing and leading green technological development will have the upper hand in the new energy order.

Balancing Green Transition with Immediate Energy Needs

While the green transition will be as vital for sustainability and energy security in the long term, immediate needs have often prevailed to force countries' hands in the face of geopolitical turmoil. Short-term energy security is becoming increasingly opposed to more long-term green goals, especially in regions like Europe, where ongoing energy crises are putting green transition plans to the test.

Most economies, especially emerging ones, still depend on fossil fuels. While renewable energy capacity is increasing, there is still a significant dependency on fossil fuels.[34] This paradox suggests that if countries are to have energy security in

31) Johansen, (2021).

32) American Clean Power. "Clean Power Quarterly Market Report | Q2 2024," (2024). Retrieved on 15 October 2024. See https://cleanpower.org/resources/clean-power-quarterly-market-report-q2-2024-2/

33) Agora Energiewende, "What is the German Energiewende?" (25 March 2024). Retrieved on 15 October 2024. See https://www.agora-energiewende.org/about-us/the-german-energiewende/q1-what-is-the-german-energiewende

34) M. Igini, "Fossil Fuels Accounted for 82% of Global Energy Mix in 2023 Amid Record Consumption: Report," Earth.org (26 June 2024). Retrieved on 15 October 2024. See https://earth.org/fossil-fuel-accounted-for-82-of-global-energy-mix-in-2023-amid-record-consumption-report/#:~:text=Our%20%E2%80%9Cenergy%20hungry%E2%80%9D%20world%20chewed,latest%20report%20on%20world%20energy

the short run, they may need to increase their fossil fuel use while working towards long-term decarbonization.

Following the Ukraine war, countries looking to phase out coal and reduce reliance upon natural gas suddenly found themselves in an energy crisis. The need to secure immediate energy supplies threw them into a no-easy choice.[35] One of the severe tensions that arises from the need to balance green transition with immediate needs is the supply of renewable energy sources. Unlike fossil fuels, renewables cannot provide a base load for energy supply, which has meant significant investments in energy storage technologies and grid infrastructure are required to populate adequate energy sources. The energy crisis in 2022-2023 has been heavily weighing upon the European energy grid because renewables alone could not produce the sudden spike in demand caused by the reduced supplies of Russian gas.[36]

This crisis has made the significance of energy storage systems and the need to modernize the existing grids to address the intermittent nature of renewable energy production even more evident. Such infrastructural issues need to be resolved to achieve a resilient energy system where short-term energy crises can be alleviated without jeopardizing long-term green transition targets.

The Role of Sanctions and Related Trade Disruptions

One of the most common tools that help in geopolitical strategy is sanctions and related trade disruptions.[37,38] However, their interaction with the energy security dimension has reached a new qualitative level in the context of the green transition, as demonstrated by the recent conflicts and sanctions targeting major exporters of fossil fuels that impact the whole energy market. Such sanctions exacerbate the existing vulnerabilities, highlighting the need for diversification and resilience of energy systems.

The most classic example of how trade disruptions may destabilize energy markets is the 2022 Russian invasion of Ukraine and the associated sanctions imposed on Russia. Sanctions against one of the world's largest oil and natural gas suppliers cut off its supplies to Europe and other countries. The consequences were harsh for Europe, which had to change its energy sources quickly and turn to alternative suppliers such

35) M. Ringel, M. Knodt and N. Bruch, "Secure and Sustainable? Unveiling the Impact of the Russian War on EU Energy Governance," in C. Wiesner & M. Knodt (Eds.), *The War Against Ukraine and the EU: Facing New Realities* (Palgrave Macmillan, 2024): p. 133-161.

36) D. Ah-Voun, C. K. Chyong and C. Li, "Europe's Energy Security: From Russian Dependence to Renewable Reliance," *Energy Policy*, Vol. 184, (2023): p. 113856. https://doi.org/10.1016/j.enpol.2023.113856

37) K. Barbieri, "Geopolitics and International Trade", in Z. Cope (eds) *The Palgrave Handbook of Contemporary Geopolitics* (Palgrave Macmillan, Cham, 2024). See https://doi.org/10.1007/978-3-031-25399-7_49-1

38) V. Jakupec, "The Sanctions Wars: Impacts and Consequences," in: *Dynamics of the Ukraine War. Contributions to International Relations* (Springer, Cham, 2024). See https://doi.org/10.1007/978-3-031-52444-8_5

as the United States and Qatar for LNG supplies.[39]

While these sanctions were meant to reduce influence and power geopolitically for Russia, they also created this unintended consequence of inflated energy prices worldwide and shortages in key European markets.[40] A scenario like this now demonstrates how vulnerable the regions relying on particular suppliers are. This would link the importance of energy diversification in mitigating future trade disruptions' impacts.

Sanctions and trade disruptions will affect the supply chains of crucial materials needed for the green transition.[41] Typical examples of renewable energies using these materials include wind turbines and solar panels, with electric vehicles dependent on rare earth elements, among other critical minerals. It often involves production in just a handful of countries, and China already controls the global supply of rare earth elements. The geopolitical tension between China and the Transatlantic region could lead to trade restrictions that create supply disruptions for that material, undermining the pace of green transition.[42,43,44]

Only in the face of such risks have countries begun to diversify supply chains, develop domestic capacity for production, and recycle these critical materials. This will be important in the future, as geopolitical conflicts will not impede the green transition.

Transatlantic Cooperation for Sustainable Energy Security

Transatlantic cooperation is increasingly becoming one of the cornerstones of energy policy in Europe and North America, with challenges going from energy security to the green transition. Accordingly, the two sides of the Atlantic have been working together much more than before, notably on issues such as the development of renewable energy, energy storage technologies, and grid modernization to reduce dependency on fossil fuels while ensuring the security of energy supply.

39) Y. Chen, J. Jiang, L. Wang and R. Wang, R. "Impact Assessment of Energy Sanctions in Geo-Conflict: Russian–Ukrainian War," *Energy Reports*, Vol. 3 (2023): p. 3082–3095. https://doi.org/10.1016/j.egyr.2023.01.124

40) J. Schott, "Economic Sanctions Against Russia: How Effective? How Durable?" Peterson Institute for International Economics Policy Brief, No. 23-3, 13 April 2023. Available at https://ssrn.com/abstract=4431076

41) International Renewable Energy Agency, "Geopolitics of the Energy Transition: Energy Security," (April 2024). Retrieved on 15 October 2024. See https://www.irena.org/Digital-Report/Geopolitics-of-the-Energy-Transition-Critical-Materials#way-forward

42) J. Mardell, "Transatlantic Strategy on Critical Raw Materials," Heinrich Böll Foundation (March 2024). Retrieved on 15 October 2024. See https://us.boell.org/sites/default/files/2024-03/transatlantic-strategy-on-critical-raw-materials.pdf

43) R. Jorge, "Geopolitical Risk: Raw Materials and Technological Dependence," Elcano Royal Institute, 15 March 2023. Retrieved on 15 October 2024. See https://www.realinstitutoelcano.org/en/commentaries/geopolitical-risk-raw-materials-and-technological-dependence/

44) G. A. Casanova, "Rare Earths: Is There Room for a Western Alternative to China?" The Italian Institute for International Political Studies, 5 August 2021. Retrieved on 15 October 2024. See https://www.ispionline.it/en/publication/rare-earths-there-room-western-alternative-china-31344

Traditionally focused on military defense, NATO has increasingly realized energy security as a strategic concern. In the last few years, the alliance has extended the scope to include resilience in energy supply, emphasizing relevant cyber-attacks against energy infrastructures and the vulnerability of the energy supply chain, considering geopolitical conflicts.[45] The interest shown by NATO highlights an increasing awareness that energy security is not exclusively an economic issue but also one of national and regional security.

For instance, critical infrastructure vulnerabilities have been the subject of substantial studies through the contribution of the NATO Energy Security Centre of Excellence based in Lithuania.[46] In light of events in Ukraine, protecting energy systems from physical and cyber disruptions and boosting energy efficiency in member states' green technologies has become the center's number one priority.

Other evidence supporting transatlantic cooperation includes the U.S.-EU Energy Council, another venue for regular cooperation in enhancing energy security and the green transition.[47,48] The Council was established in 2009 and has been one of the leading platforms for advances in renewable energy development, energy efficiency, and innovation in clean energy technologies since then. It also remains exceedingly relevant to coordinating responses through the U.S.-EU Energy Council to the current energy crisis brought on by the Ukraine conflict- to reduce Europe's dependence on Russian energy imports and accelerate the deployment of renewables.

This cooperation has strengthened the Transatlantic Alliance and set an example of how significant economies can cooperate in energy security and sustainability efforts. Given the existing geopolitical difficulties with stable and secure energy supplies, Europe and North America will decide on the further development of the green transition by closely cooperating.

Concluding Remarks

The crises in Europe and the Middle East have shaped the Transatlantic energy security perspective of the 21st century. These crises have revealed the fragility of the current energy system structure and emphasized geopolitical risks such as the

45) A. Bocse, "NATO, Energy Security and Institutional Change," *European Security*, Vol. 29, No. 4 (2020): p. 436–455. https://doi.org/10.1080/09662839.2020.1768072

46) NATO Allied Command Transformation. "NATO Centres of Excellence – Energy Security (ENSEC COE)," 28 August 2023. Retrieved on 15 October 2024. See https://www.act.nato.int/article/nato-centres-of-excellence-energy-security-ensec-coe/

47) Office of International Affairs. (n.d.). "U.S. - EU Energy Council," Energy.gov. Retrieved on 15 October 2024. See https://www.energy.gov/ia/us-eu-energy-council

48) European Commission, "United States of America: EU-U.S. Cooperation on Energy Issues," Retrieved on 15 October 2024. See https://energy.ec.europa.eu/topics/international-cooperation/key-partner-countries-and-regions/united-states-america_en

strong dependence on fossil fuels and the respective need to speed up the integration of renewables in the energy system. Since the Transatlantic cooperation area has been trying to find its way through these challenges, it goes without saying that energy security will continue to be one of the most important decisive factors in policymaking.

A new age of energy politics across the Transatlantic region is, bar none, intermingled: energy security linked with the green transition and geopolitical tensions. Indeed, energy diversification has never been so in evidence as it is now, with countries working toward securing reliable supplies amidst conflict and sanctions. Renewable energy is now increasingly seen as the key ingredient in reducing many risks associated with a classical reliance on fossil fuels, providing greater energy independence and resilience. However, decreasing carbon emissions in a low-carbon economy is a highly complex process requiring nations to balance short-term energy needs against long-term sustainability goals.

Added to this complex transition in energy issues, geopolitical conflicts and disrupted trade might affect the international supply chains, especially critical materials related to renewable technologies. In this context, Europe and North America prioritize strengthening their energy security and accelerating their green transition, making transatlantic cooperation even more critical. Key actors such as NATO and the U.S.-EU Energy Council promote this cooperation and pave the way for a more secure and sustainable energy system.

It will depend on which countries can manage increasingly complex geopolitical tensions and invest in infrastructure, technologies, and policies to advance toward a green transition rapidly. In this regard, the Transatlantic region can lead the world toward a future wherein energy security goes hand in hand with sustainability, even during global uncertainty, foster more international collaboration, and embrace innovative solutions.

Research Article

CHINA'S APPROACHES TO THE BRICS: REGIONAL GEOPOLITICS AND BILATERAL DIMENSIONS

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This paper provides a critical overview of China's strategy in the BRICS. In the wake of the expansion of the membership of the group with the inclusion of five new members —Saudi Arabia, Iran, Ethiopia, UAE, and Egypt— in January 2024, and the shifting regional and global geopolitical situations, China's objectives and strategies in the institution gain significance for understanding how China is crafting its strategy as a rising power. While the fluid geopolitical situation due to sluggish global economic recovery, flaring up of conflicts, namely the Israel-Hamas war, Russia-Ukraine war with global economic and geopolitical consequences, and rising tensions between China and the USA make the expanded BRICS geopolitically significant, these changes also bear upon the bilateral and regional dynamics of relationships among member states and the very role of the institution as such. In this respect, this essay answers the following questions: whether and how do these factors shape the group's identity and role? In this respect, the essay contextualizes China's strategy in the BRICS within its more extensive approach to multilateralism in the last two decades.

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Keywords: China, India, BRICS, Expansion, Geopolitics.

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Change, Security, and Sustainability in Energy

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This paper provides a critical overview of China's strategy in the BRICS. In the wake of the expansion of the membership of the group with the inclusion of five new members —Saudi Arabia, Iran, Ethiopia, UAE, and Egypt— in January 2024, and the shifting regional and global geopolitical situations, China's objectives and strategies in the institution gain significance for understanding how China is crafting its strategy as a rising power. While the fluid geopolitical situation due to sluggish global economic recovery, flaring up of conflicts, namely the Israel-Hamas war, Russia-Ukraine war with global economic and geopolitical consequences, and rising tensions between China and the USA make the expanded BRICS geopolitically significant, these changes also bear upon the bilateral and regional dynamics of relationships among member states and the very role of the institution as such. In this respect, this essay answers the following questions: whether and how do these factors shape the group's identity and role? What does China's perception and vision of the BRICS tell us about the future role of the group from a Chinese perspective? It argues that with an expanded BRICS and China's proactive efforts to raise the group's role beyond economic cooperation, the internal coherence and consensus among member states on the role and identity of the group as a multilateral institution designed for economic, people-to-people, and a platform for member states to interact despite differences among them. In this respect, the essay contextualizes China's strategy in the BRICS within its more extensive approach to multilateralism in the last two decades.

China in BRICS: Entanglement of Security and Geo-economics and Multilateralism

China's approaches to the BRICS —an 11-member group comprising states from Asia, Africa and Latin America —have gradually shifted in importance as part of its changing foreign policies and strategies to the international order in the post-Cold War period. And this shift is part of China's changing identity and status in the world as its economic and military power. China has gradually come to embrace international institutions, and international law, and use them in its interactions with the outside world. Thus, from 1970 onwards, when China joined the UN, it gradually joined almost every major institution.[1] However, it is only in the 21st century that China seems to have proactively embraced multilateral institutions as part of its foreign policies.[2] A significant part of this shift is its participation and promotion of the BRICS, Shanghai Cooperation Organization (SCO), Asian Infrastructure and Investment Bank (AIIB), and New Development Bank (NDB), among others.

As such, China's participation in multilateral institutions forms one of the pillars of

1) Joseph Yu-Shek Cheng, *Multilateral Approach in China's Foreign Policy* (World Scientific: Singapore, 2018).

2) Sun Xuefeng, "The Efficiency of China's Multilateral Policies in East Asia (1997–2007)," *International Relations of the Asia-Pacific*, Vol. 10, No. 3 (2010): 515–541.

China's strategy for the international order. While China pursues bilateral relations, it even prefers to use bilateral channels over others to take advantage in negotiations, China has put an emphasis on multilateralism, and participation and initiation of multilateral institutions. It has a member of almost all multilateral institutions namely, Asia-Pacific Economic Cooperation (APEC) and ASEAN+3. It has also expressed willingness to be part of other regional organizations namely, the South Asian Association for Regional Cooperation (SAARC) and the Organization of Islamic Countries (OIC). Its attempts to expand its influence in the BRICS region are thus part of the larger strategy.

China uses multilateral institutions to promote its image as a responsible power, advance its security and economic interests or thwart something that is against its interests from taking place.[3] Chinese foreign policy also relies on normative narratives, which include "the Community of Shared Interests," "peaceful rise," and "developmental peace," to justify its policies in terms of a larger good and interests of all.[4]

If we make conceptual and empirical intern-connections among these three dimensions of China's regional strategy with its key objectives, then it becomes clear how such a regional strategy pursued by China shapes the geopolitical and strategic dimensions.

BRICS and the Geopolitical Competition for a Greater Influence in Global South

BRICS emerged in the first decade of the 21st century at the peak of the "unilateral moment" of the U.S. predominance. Its formation reflected a more significant tendency to soft balance against the U.S.[5] However, as it happens with most of the things in politics and foreign policy, states have only vague ideas about how their long-term objectives will be realized and the means to pursue them. BRICS's objectives were modest despite an oft-repeated goal of reforming the international economic order. In different degrees of intensity and reasons, this objective is shared by other founding member states. Therefore, its importance and goals in China's strategy in BRICS have reflected its changing power and strategies.

From the early years of 21st century, while its GDP and military power have doubled, its strategy has also changed. It has aggressively pursued an agenda to expand its influence in existing multilateral institutions, namely the United Nations, and has

3) Mark Beeson, "Asia's Competing Multilateral Initiatives: Quality versus Quantity," *The Pacific Review*, Vol. 32, No. 2 (2019): 246-247.

4) Chung Chien-peng, "The 'Good Neighbour Polic' in the Context of China's Foreign Relations," *China: An International Journal*, Vol. 7, No. 1 (2009): 107-123; Zhang Dong, "The Concept of 'Community of Common Destiny' in China's Diplomacy: Meaning, Motives and Implications," *Asia and the Pacific Policy Studies*, Vol. 5 No. 1 (2018): 196– 207.

5) Yi Edward Yang, "China's Strategic Narratives in Global Governance Reform under Xi Jinping," *Journal of Contemporary China*, Vol. 30, No. 128 (2021): 299-313.

embraced participation in various types of multilateral institutions and forums. A clear indication of China's strategic use of multilateral institutions is the promotion of multilateral institutions where it holds leverage and becomes part of even not-so-influential institutions in different regions ranging from.

China's diplomatic approach to engaging with countries as a group and bilaterally also reflects an emerging approach in China's diplomatic practice or "forum diplomacy".[6] For instance, China holds the annual Forum of China-Africa Cooperation (FOCAC) with 53 countries from Africa, the China-Latin American and Caribbean Forum (China-CELAC), the China–Arab States Cooperation Forum (CASCF), and the first China-Central Asia Forum. These diplomatic efforts aim to bring in more countries into institutions and dialogue forums where China has a more significant say. In addition, the aim is also to evolve a China-friendly view of countries on specific issues, namely, one China policy, issues of human rights violations, and the push for a narrative that China is a peaceful and benign power.

Therefore, China's efforts to proactively promote the expansion of the BRICS since 2017 form part of these more considerable changes in China's diplomatic strategies amidst changing geopolitical situation. Although all founding members agreed to expand the group in 2022, China has been by far the most fervent supporter of the same. During this period, it has advocated the candidature of a range of countries covering different sizes of GDP and regional influence, and, crucially, countries with which China has developed friendlier relationships in the last few years. In this context, the Belt and Road Initiative (BRI) is one big factor for building influence but not the sole one.

For example, while the Johannesburg Summit agreed upon criteria that countries with certain economic weightage and regional influence from developing countries would be inducted, China has advocated for Pakistan, which has close geopolitical relations with China, five newly inducted countries, and has consistently articulated its position to bring in a greater number of countries. In brief, China's goals and vision of BRICS have shifted. China's diplomatic strategy has framed the BRICS as a platform for solidarity among developing countries, advocated for countries it has friendly relations with, and the fact that it has also called for a more significant and proactive geopolitical role of the BRICS, for instance, in articulating voices of developing countries on issues such as the Israel-Hamas war.

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6) Devendra Kumar, "China and Central Asia: Ambitions and Great Power Signalling," Politeia Research Foundation, 14 July 2023, available at https://prfworld.org/china-and-central-asia-ambitions-and-great-power-signalling/; Paul Nantulya and Leland Lazarus, "Lessons from China's Forum Diplomacy in Africa, Latin America, and the Caribbean," Africa Centre for Strategic Studies, 22 January 2024, available at https://africacenter.org/spotlight/lessons-from-chinas-forum-diplomacy-in-africa-latin-america-and-the-caribbean/

BRICS Expansion: More Weightage yet Greater Divergence?

With the inclusion of five new members, the expanded BRICS represents greater diversity in terms of regional representation, economic weight, and population. They are all bound by a set of criteria, principles, and rules, which emphasize on the fact that decisions are taken with consensus, represent the interests of developing countries, and should not impose sanctions on other BRICS countries that are not authorized by the United National Security Council (UNSC), among others.[7] Therefore, the expansion of the BRICS is a significant move because more countries with regional influence and economic power have come together and their commitment not to impose non-UNSC authorized sanctions limits the powers of the USA which requires compliance by regional powers for sanctions.

However, the inclusion of countries with diverse interests and foreign policy approaches opens up a space for the possibility of the BRICS getting stuck due to differences among member states. Added to that, given that China and Russia are pushing for a greater geopolitical role of the BRICS in articulating the collective voice of developing countries on regional and global geopolitical issues, this is likely to push greater divergence among member states about the identity and role of the institution.

All member states seek and agree on the need for global governance reform, including the reform of UNSC. In addition, every member emphasizes greater economic cooperation and exchanges beyond the hegemony of the global trade and financial system by U.S. dollar in different measure and degrees shaped by their respective national economic and foreign policies. However, Brazil, India, and South Africa have expressed hesitation in projecting the BRICS's role in geopolitical issues due to their respective balancing foreign policies between the U.S. and its European allies, and China, on the other hand. While Russia is also seeking to project the geopolitical role of BRICS in a bid to maintain its diplomatic space in the developing world amidst its war with Ukraine, its policies on this issue align with China. As a result, the inclusion of new members is likely to complicate the consensus among member states about the identity and role of the BRICS.

Bilateral relations among member states will also bear upon nature of the evolution the BRICS. Notably, China's push for an expanded role of BRICS, at a time when its geopolitical competition with the USA and India in the global south is rising, is a major factor. China has been an ardent supporter of expanding BRICS membership since 2017 in an effort to bring in countries closer and build BRICS as a platform for non-western countries, which may not be allies but are bound by common interests.

7) "BRICS Membership Expansion: Guiding Principles, Standards, Criteria and Procedures," November 2023, available at https://brics2023.gov.za/wp-content/uploads/2023/11/BRICS-Membership-expansion-guiding-principles-criteria-and-standards-2023.pdf

However, this has not gone down well with India, Brazil, and South Africa. Their approach to membership expansion, for example, has been cautious, and so has been their articulations of the institution's role as a platform for seeking greater economic cooperation and global governance reform. However, wider discussions among strategic communities of these countries underscore their urge to use BRICS as a platform for balancing their economic and foreign policies while refraining from indicating its role in the emerging binaries of the U.S. and its allies versus others.

Conclusion

To conclude, China's diplomatic approaches and objectives align with its larger geopolitical interests and diplomatic approach, which is to engage with countries both bilaterally and through multilateral platforms. Particularly, China wants to promote multilateral institutions that can become a bulwark against the influence and power of the USA and its allies. In the same vein, these institutions are projected to become a platform for countries whose broader interests align with those of China. For example, the criteria that BRICS members should not impose non-UNSC authorized sanctions is consequential if and when the U.S. and its allies impose sanctions on China. Similarly, greater economic cooperation and improvements in bilateral economic and political relations with member states are goals that China seeks to achieve other objectives, such as shifting to a global financial order in which the U.S. dollar no longer holds hegemony.

However, more countries in the institution mean diversity of voices and interests, which given that decisions are taken by a consensus and China is pushing the institution to bear greater responsibility in geopolitical issues, it will lead to divergence.

Research Article

ENERGY SECURITY, GREEN TRANSFORMATION, AND THE NEW CHALLENGES EMERGING FROM RECENT GEOPOLITICAL CONFLICTS IN TÜRKIYE AND EUROPE

DOI: 10.58867/HULJ3536

This paper explores the complex dynamics between energy security, green transformation, and recent geopolitical challenges in Türkiye and Europe. With Europe's drive towards renewable energy, Türkiye's role as a critical energy hub becomes increasingly vital. Conflicts such as the war in Ukraine have exposed vulnerabilities in fossil fuel dependence and strained regional energy security. By focusing on the strategic role Türkiye plays and how both regions are navigating the energy transition, this paper evaluates their policies, collaborations, and efforts to align energy security with the green transformation. It also analyzes the new challenges created by recent geopolitical conflicts and their impact on energy markets.

Berk Türkel*

Keywords: Energy Security, Green Transformation, Geopolitical Conflicts, Türkiye, Europe.

TPQ

Summer 2024

Change, Security, and Sustainability in Energy

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Energy security has long been a fundamental concern for both Europe and Türkiye, two regions with distinct energy needs yet shared vulnerabilities. Europe, heavily dependent on imported energy, has urgently needed to diversify its energy supply due to geopolitical instability, especially following Russia's invasion of Ukraine.[1] At the same time, the European Union has embarked on an ambitious path toward decarbonization, encapsulated in the European Green Deal, which seeks to achieve carbon neutrality by 2050.[2]

Türkiye, situated at the crossroads of East and West, has emerged as a vital energy transit hub. With pipelines such as the Trans-Anatolian Natural Gas Pipeline (TANAP) and the Trans-Adriatic Pipeline (TAP), Türkiye plays a critical role in ensuring Europe's energy security.[3] However, the challenges posed by recent geopolitical conflicts and the global drive for green transformation have placed new pressures on both Türkiye and Europe. This paper examines how these two regions have been navigating the delicate balance between energy security and green transformation while contending with emerging challenges.

Energy Security and Geopolitical Conflicts

Türkiye as a Strategic Energy Hub

Türkiye's geographical location gives it a strategic advantage in global energy markets. Pipelines that carry natural gas from the Caspian Sea region and the Middle East to Europe run through Türkiye, making it a critical energy corridor.[4] The TANAP and TAP pipelines, which are part of the Southern Gas Corridor, deliver gas from Azerbaijan to European markets, reducing Europe's reliance on Russian energy supplies.[5]

This role has gained even more significance in the wake of the Ukraine war. Europe's decision to reduce its energy dependency on Russia has increased its demand for alternative suppliers, and Türkiye's infrastructure provides an essential link to these sources. As Europe diversifies its energy mix, Türkiye's energy security also benefits from this diversification, creating a mutually beneficial relationship. However, the ongoing conflict in Ukraine has also disrupted supply chains, creating vulnerabilities

1) S. Tagliapietra, "The Impact of the Ukraine War on European Energy Policy." *Energy Journal*, Vol. 43, No. 3 (2022): p. 33-48.

2) European Commission, *The European Green Deal*. European Commission (2020).

3) M. Bilgin, "Geopolitics of European Natural Gas Demand: Supplies from Russia, Caspian and the Middle East," *Energy Policy*, Vol. 37, No. 11 (2009): p. 4482-4492.

4) Bilgin (2009).

5) F. Umbach, "Energy Security in the Wake of Geopolitical Crises: A European Perspective," *Journal of Energy Policy*, Vol. 45, No. 7 (2022): p. 654-671.

in energy transit routes.[6]

Impact of the Ukraine-Russia Conflict

The war in Ukraine has dramatically altered the energy landscape of Europe. Before the war, Europe imported nearly 40 percent of its natural gas from Russia. However, European countries were forced to seek alternative energy sources with the imposition of sanctions and the subsequent reduction in gas flows through Nord Stream 1.[7] This sudden disruption revealed the extent of Europe's over-reliance on Russian energy, highlighting the urgent need for diversification and investment in renewable energy infrastructure.[8]

Türkiye, while not as dependent on Russian gas as many EU countries, also felt the impact. The disruption in supply and rising global energy prices strained Türkiye's energy imports, increasing the country's energy costs and heightening its energy security concerns.[9] Furthermore, geopolitical tensions between NATO allies and Russia have increased the risks to critical energy infrastructure, including pipelines and LNG terminals, which could become targets in a broader conflict.

Green Transformation in Europe and Türkiye

Europe's Green Deal and Energy Transition

Europe's response to the energy crisis caused by the Ukraine war has been twofold: securing alternative energy supplies and accelerating the green transformation. The European Green Deal, which aims to make Europe the first climate-neutral continent by 2050, represents a significant commitment to reducing greenhouse gas emissions, investing in renewable energy, and achieving energy independence.[10]

The European Union's REPowerEU plan, launched in response to the Ukraine crisis, focuses on reducing fossil fuel use, increasing energy efficiency, and ramping up renewable energy production. This initiative complements Europe's long-term green transformation goals by increasing energy resilience while reducing dependence on external suppliers.[11]

6) Tagliapietra, (2022).
7) Tagliapietra, (2022).
8) Umbach, (2022).
9) Turkish Ministry of Energy and Natural Resources, Turkey's National Energy Strategy and Green Energy Transition (2023).
10) European Commission, (2020).
11) Umbach, (2022).

Türkiye's Renewable Energy Potential

Türkiye, as a rapidly growing economy with increasing energy demands, has been exploring its own green transformation. While Türkiye remains heavily reliant on fossil fuels, particularly natural gas and coal, the country has made significant strides in developing its renewable energy sector.[12] Türkiye is well-positioned to expand its use of solar, wind, and hydroelectric power, with solar energy potential in southern regions and favorable wind conditions in the Aegean and Marmara regions.

The Turkish government has set ambitious targets to increase the share of renewables in its energy mix. By 2035, Türkiye intends to generate 55 percent of its electricity from renewable sources.[13] This transformation not only aligns with global decarbonization efforts but also strengthens Türkiye's energy security by reducing its dependence on imported fossil fuels.

New Challenges Arising from Geopolitical Conflicts

Disruption of Energy Markets

The recent geopolitical conflicts, particularly the war in Ukraine, have led to significant volatility in global energy markets. The sanctions on Russia and the disruption of gas supplies have led to skyrocketing energy prices, impacting both Türkiye and Europe. For Europe, this has accelerated the urgency to diversify energy sources and ramp up investment in renewable energy.[14] For Türkiye, rising energy costs have underscored the need to secure more reliable and affordable energy supplies.[15]

Additionally, the risk of future conflicts affecting critical energy infrastructure remains a concern. For example, sabotaging the Nord Stream pipeline raised alarms about the vulnerability of underwater and overland energy networks.[16] Protecting these assets is now a high priority for both regions.

Energy Infrastructure and Security Risks

Energy infrastructure, particularly pipelines and LNG terminals, remains at risk in the current geopolitical climate. The heightened risk of cyberattacks and sabotage against energy infrastructure, as evidenced by the attacks on Nord Stream, poses significant challenges to energy security in both Europe and Türkiye.[17]

12) Turkish Ministry of Energy and Natural Resources, (2023).
13) Turkish Ministry of Energy and Natural Resources, (2023).
14) Tagliapietra, (2022).
15) Turkish Ministry of Energy and Natural Resources, (2023).
16) Umbach, (2022).
17) Umbach, (2022).

Türkiye's strategic location as an energy hub also exposes it to risks, as any conflict in the surrounding region could disrupt energy flows through its territory. This has led to increasing concerns about the need to bolster energy infrastructure security, both through physical protections and technological safeguards.

Conclusion

The intertwined challenges of energy security, green transformation, and geopolitical instability present both risks and opportunities for Türkiye and Europe. The war in Ukraine has underscored the vulnerabilities in fossil fuel dependence, while accelerating the push toward renewable energy. Türkiye, as a strategic energy hub, has a pivotal role to play in Europe's energy future, offering both transit routes for natural gas and potential partnerships in renewable energy projects.

As the green transformation progresses, cooperation between Türkiye and Europe will be crucial for maintaining energy security while achieving climate goals. By aligning policies and investing in sustainable energy infrastructure, both regions can navigate the complex landscape of geopolitical challenges and create a more resilient energy future.

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Research Article

REDEFINING ENERGY SECURITY: A MULTI-DIMENSIONAL APPROACH IN A CHANGING GLOBE

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The global energy landscape is undergoing a profound transformation, driven by a confluence of challenges and opportunities. The traditional paradigm of energy security, heavily reliant on fossil fuels and prioritizing access over sustainability, is being reshaped by a growing awareness of climate change, geopolitical volatility, and the imperative for a more resilient energy future. This article delves into the shifts taking place in global energy security, highlighting the increasing prominence of renewable energy sources, technological advancements, and the crucial role of sustainability as a defining dimension of this transformation.

Fatih Barış Altunyuva*

Keywords: Energy, Energy Security, NATO, Transition, Sustainability.

TPQ

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Change, Security, and Sustainability in Energy

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Energy is an indispensable element in both our daily lives and the global economy. Its escalating importance has propelled it to the status of a defining factor in the 21st century. Serving as a fundamental physical foundation, it is crucial for ensuring economic growth and social progress. It fuels industries, powers our homes, enables transportation, and underpins the very fabric of modern society

Beyond its economic significance, energy is also a vital and strategic component that profoundly influences a nation's domestic and international policies. The availability and accessibility of energy resources can impact geopolitical relations, trade agreements, and even national security.

Energy is the lifeblood of sustainable development, a cornerstone of economic and social growth, and a vital driver of technological advancement. A nation's per capita energy consumption serves as a reliable indicator of its developmental stage and the intensity of its economic activities.

However, our globe faces complex energy challenges. The critical role of energy in propelling development across various sectors, particularly economic growth, highlights the urgent need for secure, accessible, affordable, and uninterrupted energy supplies.

The global energy landscape is undergoing a profound transformation, driven by a complex interplay of challenges, including climate change, geopolitical tensions, and the urgent need for secure energy supplies. This landscape is further destabilized by the ongoing Russia-Ukraine war, which has escalated the threat to the global economy, causing ripple effects through food and energy prices, as well as exacerbating casualties and migration problems. This conflict starkly highlights the vulnerabilities of the global economy, placing geopolitical risks at the forefront. Inflation, a burgeoning economic crisis, has been fueled by skyrocketing commodity prices, particularly energy costs, impacting both advanced and emerging economies. This crisis has spurred a critical re-evaluation of the concept of energy security. Traditionally focused on ensuring reliable access to energy sources, primarily fossil fuels, the concept has evolved to embrace a broader, more integrated vision encompassing sustainability and resilience.

The global energy landscape is undergoing a profound transformation, driven by a confluence of challenges and opportunities. The traditional paradigm of energy security, heavily reliant on fossil fuels and prioritizing access over sustainability, is being reshaped by a growing awareness of climate change, geopolitical volatility, and the imperative for a more resilient energy future. This article delves into the shifts taking place in global energy security, highlighting the increasing prominence of renewable energy sources, technological advancements, and the crucial role of

sustainability as a defining dimension of this transformation.

The concept of energy security now encompasses several dimensions: availability of energy resources, affordability, environmental sustainability, and resilience to disruptions. In this context, renewable energy sources, such as solar, wind, hydropower, and geothermal, are becoming increasingly central to the energy security debate. The rise of clean energy technologies and the global transition towards decarbonization are reshaping the energy sector and the geopolitical landscape, with profound implications for how nations secure their energy needs.

According to the International Energy Agency (IEA), due to supportive policies and favorable economics, the world's renewable power capacity is expected to surge over the rest of this decade – with global additions on course to roughly equal the current total power capacity of China, the European Union, India, and the United States combined. Massive growth in renewables by 2030 is set to transform the electricity sector.

In the IHS Markit scenarios, global electric consumption will grow by up to 60 percent by 2040. Wind and solar constitute 24 to 36 percent of total generation by that date. Either is a significant increase in wind and solar from today's 7 percent globally. The reasons for the variance result from what one would expect uncertainties and varying assumptions about technology and innovation, and policies and economics.[1]

The rise of renewables is already reducing the need for imports of fossil fuels for some countries, but broad-based reliance on fossil fuels will remain in the coming decades.[2]

The 1970s oil crisis prompted the rethinking of national energy strategies. France focused on developing nuclear power, while Denmark and Brazil started investing in renewable energy. Over time, as the rapid industrialization of emerging markets intensified competition for oil, natural gas gained strategic importance. Coupled with the growing focus on climate change, the pressure to diversify both fuels and producers intensified. The energy crisis of 2022 marked a turning point in the global energy discourse. In the wake of the COVID-19 pandemic, energy demand surged as governments sought to stimulate economic recovery. At the same time, other challenges emerged, encompassing supply chain disruptions, geopolitical tensions, and changes in energy policy, exacerbated by the lasting effects of the pandemic. The intentional disruption in energy trade between Europe and Russia immediately prior and since the beginning of the war in Ukraine placed immense strain on Europe's energy sector. Compounding this problem, the fluctuating availability of nuclear power in France and severe droughts that reduced hydropower output in Europe, left the

1) Daniel Yergin, *The New Map: Energy, Climate, and the Clash of Nations* (Penguin Group, 2020): 359.

2) IRENA, "Geopolitics of the Energy Transition," April 2024. Available online at https://www.irena.org/Publications/2024/Apr/Geopolitics-of-the-energy-transition-Energy-security

European Union with a shortage of approximately 7 percent of its low-cost electricity supplies in 2022.[3] Fuel shortages, competition for limited resources, inflation, rising food costs and increased living expenses worldwide have rippled through sectors and geographies, suppressing or even reversing previous advances and widening the gap between haves and have-nots. The fragility of economies reliant on imported fossil fuels was exposed, along with the political and social consequences that energy insecurity brings. In addition to imported fossil fuels two main issues relating to current energy use are scarce resources and climate change. Energy efficiency (a new energy source), alternative energy sources, and carbon sequestration for greenhouse gas reduction are possible methods.

In that sense, we can easily state that climate change became a primary international concern in the last quarter of the 20th century and will likely be the defining issue of the 21st century: increase in average temperature, increase in extreme weather events, melting glaciers and rising sea level, combined with the pressure on environmental resources by increasing population. Our present production and consumption of energy are unsustainable.

This alarm about climate is the great motivator for the energy transition. Energy transitions are not new. They have been going on for a long time and unfold over time. Technology, economics, environmental considerations, and convenience and ease have primarily driven previous energy transitions. The current energy transition has a more pronounced mix of politics, policy, and activism.[4]

Energy transition means different things to different nations, especially in the developing world. A billion people lack access to electricity; three billion do not have access to clean cooking fuels. Instead, they burn wood, charcoal, crop waste, or cow dung indoors, impairing their health. This leads to a different perspective.[5]

The first energy transition began in Britain in the thirteenth century with the shift from wood to coal. Rising populations and destruction of forests made wood scarce and expensive, and coal came to be used for heating in London.[6]

If environmental sustainability, defined as meeting the needs of the present generation without compromising the needs of future generations, is to be achieved, and energy security for future generations is to be assured, then a fundamental shift in our energy use is necessary one that embraces sustainability.

3) Georg Zachman, "The Great 2022 European Energy Crisis – What Actually Happened and How Did Europe Cope?" BRUEGEL, 16 January 2023. Available online at https://www.bruegel.org/newsletter/great-2022-european-energy-crisis-what-actually-happened-and-how-did-europe-cope-0

4) Daniel Yergin, (2020): 339-341.

5) Daniel Yergin, (2020): 365.

6) Daniel Yergin, (2020): 340-341.

We can see this transformation even in the most successful and long-standing military and political institution, NATO. With the power of change and adaptation, it has adapted itself to current threats. For this purpose, the Strategic Concept sets the Alliance's strategy. It outlines NATO's enduring purpose and nature, its fundamental security tasks, and the challenges and opportunities it faces in a changing security environment. It also specifies the elements of the Alliance's approach to security and provides guidelines for its political and military adaptation.[7] The NATO 2022 Strategic Concept sets out NATO's priorities, core tasks, and approaches for the next decade.[8]

"Become the leading international organization when it comes to understanding and adapting to the impact of climate change on security. NATO will lead efforts to assess the impact of climate change on defense and security and address those challenges. Combatting climate change by reducing greenhouse gas emissions, improving energy efficiency, investing in the transition to clean energy sources and leveraging green technologies, while ensuring military effectiveness and a credible deterrence and defense posture."[9]

NATO endorsed an ambitious new NATO Action Plan: NATO 2030[10] which indicates 9 proposals, and proposal 7 is on Combat and Adapt to Climate Change, intending to make NATO the leading international organization when it comes to understanding and adapting to the impact of climate change on security. To significantly reduce greenhouse gas emissions from military activities and installations, reduction of greenhouse gas emissions by the NATO political and military structures and facilities, to assess the feasibility of reaching net zero emissions by 2050.

NATO will increase awareness by monitoring and tracking climate change much more closely, and invest in better research, data sharing and analysis. It will accelerate its adaptation to continue to operate in all conditions, including extreme heat and cold, rising sea levels, and natural disasters.

NATO will play its part in reducing military emissions. Greening militaries offers real win-wins to improve operational effectiveness by decreasing dependence on fossil fuel supplies. Recognizing that it needs to connect with other international stakeholders in its efforts to address the security implications of climate change, NATO will also begin to hold a global climate change and security dialogue, starting in 2022.

In fact, the concept of energy security has surpassed above and beyond of all dimensions in order to be able to respond to newly emerging issues and questions.

7) See NATO, at www.nato.int

8) NATO, "NATO 2022 Strategic Concept," June 2022. Available online at https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/290622-strategic-concept.pdf

9) NATO, "NATO 2022 Strategic Concept," June 2022.

10) NATO, "NATO 2030, Factsheet," June 2021. Available online at https://www.nato.int/nato_static_fl2014/assets/pdf/2021/6/pdf/2106-factsheet-nato2030-en.pdf

In that context I came to a definition that I call Multi-Dimensional Energy Security, which includes diversification of energy sources and countries of origin considering the political and economic dynamics, development of continual and affordable pricing mechanisms within a sustainable systematic and the continuation of production, transmission and distribution activities while ensuring a safe, secure, controlled and sustained energy infrastructure security. So that sustainability became an indispensable part of energy security discussions.

As a result, while the concept of energy security has expanded to include many disciplines over the years, it has undergone and continues to experience changes with the crises, transformations, and new initiatives and remains as an ever-crucial topic. As can be seen when examining the historical literature of the concept of energy security, after the golden period of oil and the subsequent oil crises suffered, natural gas and nuclear energy were included in the agenda, and following the recent energy transformation, especially with the renewable resources throwing its weight on the energy markets with revolutionary developments, the concept of energy security and the dimensions it involves began to mutate. For this very reason, it is evident that the need to elaborate and analyze these new dimensions to emerge will continue…

Research Article

LET NO ONE BE LEFT BEHIND IN ENERGY TRANSITION

DOI: 10.58867/TRYQ4134

The global energy transition is critical for addressing climate change and ensuring long-term energy security. However, significant challenges persist, particularly for Emerging Markets and Developing Economies (EMDEs), which lack the capital and investment required for a sustainable energy shift. The dominance of fossil fuels, geopolitical risks, and disparities in financing threaten progress. Investments in clean energy technologies, grid infrastructure, and innovative financing models must increase globally to meet rising energy demand. Ensuring an inclusive and equitable energy transition is vital to avoiding future inequality and ensuring global sustainability.

Emrah Özsavaşçı*

Keywords: Western Balkans, Regimes that Obstruct, European Commission, European Integration, EU Expansion.

TPQ

Summer 2024

Change, Security, and Sustainability in Energy

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It is difficult to overstate energy's fundamental role in the modern world. From communication and transportation to healthcare, industry, lighting, heating, and cooling—our standard of living is fundamentally built on the availability and consumption of energy.[1] Its significance has deepened in recent years as energy has moved to the forefront of strategic planning for companies and governments globally. Even sectors traditionally detached from energy concerns are now increasingly focused on it, driven by its pivotal role in addressing sustainability, climate change, and digitalization. What was once the domain of experts now permeates public discourse, media coverage, and policy debates, reflecting energy's expanded role in our society.

Energy Matters

Throughout history, energy has taken many forms, shaping the evolution of civilizations. For centuries, wood and animal dung were primary energy sources. The Industrial Revolution marked a pivotal shift with coal at its core, reshaping economies and societies. The development of the internal combustion engine and the rise of oil defined the 20th century, particularly in transportation.[2] The invention of electricity, and its unparalleled versatility, revolutionized technology and led to the creation of transformative devices such as the telegraph, telephone, radio, lightbulb, and a host of electrical equipment for industries and humanities daily use.[3] Today, the energy demand has only intensified with the rise of advanced communication technologies, the internet, digitalization, and artificial intelligence. These innovations, particularly data centers, which are the backbone of the digital world, consume ever-greater amounts of energy, underscoring modern society's profound and growing dependence on energy. According to IEA, since 2010, the number of internet users worldwide has more than doubled, and the global internet traffic has expanded 25-fold. However, rapid improvements in energy efficiency have helped moderate growth in energy demand from data centers and data transmission networks, which account for 1-1.5 percent of global electricity use.[4]

Energy Outlook

The world's need for energy continues to grow. Since 2000, global energy consumption has increased by an average of 2 percent annually, while electricity consumption has risen by 5.4 percent annually. Non-OECD countries dominate the growth, and global

1) Travis Bradford, *The Energy System Technology, Economics, Markets, and Policy* (MIT Press, 2018).

2) Vaclav Smil, *Energy and Civilization* (MIT Press, 2017).

3) Daron Acemoğlu and Simon Johnson, "Power and Progress," *Public Affairs* (2023).

4) IEA, "Data Centers and Data Transmission Networks". See https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks

energy demand will likely continue to rise as populations grow, living standards improve, and economies develop.[5]

Currently, fossil fuels constitute over 80 percent of global primary energy consumption, a figure that has remained relatively stagnant despite years of discussion and effort toward greening and diversifying the energy mix. Coal, oil, and natural gas continue to dominate, holding around 80 percent of the share, while renewables account for less than 15 percent, and nuclear energy contributes under 5 percent. According to the International Energy Agency (IEA), global fossil fuel consumption is expected to peak before 2030, driven by a sharp decline in coal demand. However, natural gas and oil are anticipated to grow in the near term, remaining essential components of the energy mix for decades to come.[6]

The pace at which electric vehicles (EVs) are adopted will likely be the most significant factor in determining when oil demand peaks. In the power sector, natural gas is expected to play a crucial balancing role in renewable energy generation until battery storage technologies can be scaled. In the building sector, electrification and biogas are poised to displace natural gas as energy-efficient designs become more prevalent gradually. Similarly, in industry (excluding chemicals), the electrification of heat and machine operations is projected to lead to a gradual decline in gas demand, mirroring the building sector trend.[7]

Renewable energy sources and emerging clean energy technologies will play a central role in meeting growing energy needs sustainably. Renewables are expected to maintain their rapid growth, driven by their cost competitiveness. In many regions, they are already the most cost-effective option for new power generation. According to IRENA, 473 gigawatts (GW) added in 2023, 81 percent or 382 GW of newly commissioned, utility-scale renewable projects had lower costs than their fossil fuel-fired alternatives.[8] McKinsey's analysis suggests that renewable sources could account for 45-50 percent of global energy generation by 2030 and 65-85 percent by 2050. Solar power is expected to be the largest contributor, followed by wind. Nuclear energy and carbon capture, utilization, and storage (CCUS) technologies could alleviate some pressure on renewables, but their future depends heavily on political landscapes and cost developments. Meanwhile, power generation from hydrogen gas plants, which enhance grid stability, is also likely to increase.[9]

Energy consumption and investment trends are complex and vary significantly by geography. For example, coal accounts for over 50 percent of primary energy

5) 2024 Energy Institute Statistical Review of World Energy & Dignita Partners Analysis.

6) IEA, "World Energy Outlook 2023," International Energy Agency.

7) McKinsey, "Global Energy Perspective 2023".

8) McKinsey Global Institute, "The Hard Stuff Navigating the Physical Realities of the Energy Transition".

9) McKinsey, "Global Energy Perspective 2023".

consumption in China and India, while Singapore uses no coal. Kazakhstan relies on coal for more than 45 percent of its primary energy mix, while Turkmenistan consumes no coal. Even within Europe, energy mixes differ widely: France has 35 percent of Nuclear in its primary energy mix, while Italy has no nuclear generation. These variations are driven by resource, financing technological availability, consumer choices and national policies.[10]

Energy-related emissions, the production and consumption of energy accounts for more than 85 percent of global carbon dioxide (CO2) emissions,[11] have increased by an average of 1.8 percent annually since 2000. According to McKinsey, the adoption of renewables could reduce emissions from power generation by 17-71 percent by 2050 compared to today, even as energy demand doubles or triples.[12]

Investment Challenge

Ensuring a reliable and affordable energy supply is crucial to maintaining the sustainability of modern society. However, achieving this requires proactive investment before demand arises. As the energy system consists of the production, conversion, delivery, and consumption of energy resources across sectors as both fuels and feedstocks, investment is required in each link of the chain.

Historically, fossil fuels have dominated energy investments, with capital-intensive projects centered on exploration, production, and the associated supply chains. The energy sector was one of the first industries to attract large-scale foreign direct investment (FDI) globally, particularly in developing countries rich in resources but in need of capital and expertise. Group of multinational oil and gas investors sought to expand their global exploration and production (E&P) portfolios and revenues.

Following the liberalization of energy markets and the privatization of state-owned incumbents in the 1990s, multinational oil and gas companies continued their investments in newly opened markets. National governments generally welcomed FDI, as it was seen as a catalyst for market liberalization and a means to enhance energy security.

By the 2010s, the rapid pace of digitalization led to substantial investments in digital technologies in energy industry—spanning generation, transportation, and consumption.

The ongoing energy transition is further reshaping the investment landscape, with clean energy technologies like solar photovoltaics (PV) and electric vehicles (EVs) at the forefront. Since 2020, clean energy investments have surged by 40 percent, and

10) 2024 Energy Institute Statistical Review of World Energy & Dignita Partners Analysis.
11) McKinsey Global Institute, “The Hard Stuff Navigating the Physical Realities of the Energy Transition”.
12) McKinsey, “Global Energy Perspective 2023”.

global investments in clean energy are nearly double those in fossil fuels.[13]

While the urgent need to combat climate change is a key driver of this shift, other factors—such as the economic viability of mature clean energy technologies and the imperative for energy security—also play critical roles. As noted by Daniel Yergin, energy security and energy transition are deeply interconnected: without the former, the latter cannot succeed.[14]

Historically, energy security focused on ensuring the availability of primary energy supplies. Today, sustainability has become a core dimension of energy security.[15] Disruptions in global supply chains due to the COVID-19 pandemic, the ongoing Russia-Ukraine conflict, and subsequent energy shortages and price spikes have elevated energy security concerns to the forefront. Renewable energy has emerged as a potential solution to these challenges.

The International Energy Agency (IEA) estimates that by 2050, the combined market for wind turbines, solar panels, lithium-ion batteries, electrolyzers, and fuel cells could rival the size of today's oil market. However, significant challenges lie ahead. The energy transition path is fraught with uncertainties—ranging from technology trends and geopolitical risks to consumer behavior—making it difficult to craft resilient investment strategies that can adapt to multiple scenarios.

Currently, the majority of clean energy investments are concentrated in advanced economies, which offer a more stable and less risky investment environment. Emerging Markets and Developing Economies (EMDEs), excluding China, account for only about 15 percent of global clean energy spending, despite representing two-thirds of the world's population, a significant share of industrial output, and a large portion of global emissions.[16]

In the period 2012-21, the top investors of greenfield investment into renewable power came from France, Germany, Italy and Spain (41 percent of total greenfield investment in renewables). The top recipients of renewable energy FDI were Australia, Chile, the United States and the United Kingdom (accounting for 46 percent of all announced greenfield investment projects in renewable energies in 2012-21). In terms of total cross-border M&A activity into renewable energy he top destinations targeted by foreign investors in clean energy were Portugal, Spain, the United Kingdom and the United States, accounting for half of total deal values.[17]

13) IEA, "World Energy Investment 2024," International Energy Agency (June 2024).

14) GZERO Media, "Pulitzer Prize-winning author Daniel Yergin on Energy Security in a Changing World," 5 September 2024.

15) Maria Rosaria Mauro, "Energy Security, Energy Transition, and Foreign Investments: An Evolving Complex Relationship," Law and Institutions Department, Universitas Mercatorum, 00186 Rome, Italy. MDPI Published: 19 July 2024.

16) IEA, "World Energy Investment 2024," International Energy Agency (June 2024).

17) Polina Knutsson and Perla Ibarlucea Flores, "Trends, Investor Types and Drivers of Renewable Energy FDI,"

The energy transition demands comprehensive investments in both upstream (generation) and downstream (transmission, distribution, storage, and end-use) projects. These investments are highly capital-intensive, making the cost of capital a critical factor. The cost of capital, which represents the expected financial return for a clean energy project, is closely tied to the perceived risks associated with future project cash flows.

EMDE holds just one-tenth of the world's financial wealth and cannot fund their energy transitions without substantial international investment. Finishing clean energy projects is typically much higher in EMDE than in developed ones, making it crucial to reduce the cost of capital. In 2024, the cost of capital will increase across most of the world, with emerging markets and developing economies outside China facing much higher financing costs. According to the IEA's 2023 Cost of Capital Observatory Dashboard, stakeholders identified the top risks that need to be addressed to lower capital costs: political, currency, regulatory, off-taker, and transmission risks. Political and currency risks are country-wide, while the others are specific to the energy sector. For instance, currency risk is the top concern in Brazil, regulatory risk dominates in India, Indonesia, and Mexico, transmission network risk is most critical in Senegal, and political risk tops the list in South Africa and Vietnam.

Most investments in the energy sector are made by corporations, with firms accounting for the largest share of investments in both the fossil fuel and clean energy sectors. However, there are significant country-by-country variations: half of all energy investments in emerging markets and developing economies are made by governments or state-owned enterprises, compared with just 15 percent in advanced economies. Three-quarters of global energy investments today are funded from private and commercial sources, and around 25 percent from public finance, and just 1 percent from national and international development finance institutions (DFIs). Debt sustainability has become a growing concern across developing economies – three-quarters of all developing economies have debt-to-GDP ratios of at least 75 percent – so mobilizing a greater share of private finance in these markets is essential.[18] EMDE should focus on creating attractive business models for private and commercial sources.

Grids are generally financed on a corporate basis, whereas solar photovoltaic (PV) and wind projects increasingly rely on project finance structures. This distinction is particularly significant in emerging markets and developing economies (EMDEs), where corporate-based lending to utilities is challenging without addressing the underlying financial health of these entities.[19]

OECD Working Papers on International Investment 2022/02.

18) IEA, "World Energy Investment 2024," International Energy Agency (June 2024).

19) IEA, "World Energy Investment 2024," International Energy Agency (June 2024).

Equity financing plays a pivotal role in supporting clean energy technologies involving substantial upfront risks—such as geothermal and hydropower—or technologies still in the early stages of development, including battery storage, carbon capture, and low-carbon hydrogen. As these technologies mature, the associated risks are expected to decrease, making them more suitable for debt financing. However, technologies with long construction timelines, such as grid infrastructure and nuclear power, present additional challenges due to heightened technological risks.[20]

Several countries have already introduced mechanisms such as feed-in tariffs, and auctions to attract renewable energy investments. China has taken steps to support large state-owned enterprises and state-owned banks to increase clean energy finance, including through the development of sustainable finance regulations and incentives, so state ownership is expected to remain prominent even as clean energy becomes a larger part of the energy mix.

To further mitigate investment risks and enhance attractiveness, tools such as guarantees, revenue-sharing mechanisms, currency hedging instruments, subsidies, and tax incentives can be considered in emerging markets.

As the global energy transition accelerates, household investments have risen significantly. According to IEA, the share of household-driven energy spending has increased from 9 percent in 2015 to 18 percent in 2023, driven largely by the adoption of rooftop solar installations, energy-efficient building technologies, and electric vehicle purchases. However, as households take on a larger portion of energy investments, concerns about affordability and rising living costs may pose challenges to sustaining this trend. Addressing these issues will require innovative consumer finance policies and tailored financial instruments. In particular, investments in emerging markets and developing economies (EMDEs) remain constrained and demand bespoke strategies that account for their unique economic and social contexts.

The IEA's 2024 Investment Report highlights some progress. New policy initiatives, well-managed public tenders, and improved grid infrastructure in countries like India, Brazil, parts of Southeast Asia, and Africa have driven clean energy investments upward. In 2024, Africa's clean energy investments are projected to exceed USD 40 billion, nearly double the amount invested in 2020.

In 2023, multilateral development banks, including the European Bank for Reconstruction and Development (EBRD), allocated $74.7 billion in financing to low- and middle-income countries. Of this, 67 percent was directed toward combating climate change, while the remaining 33 percent supported climate adaptation efforts. Private sector investment mobilized in low- and middle-income countries totaled

20) IEA, "World Energy Investment 2024," International Energy Agency (June 2024).

$28.5 billion.[21]

To ensure that the clean energy transition brings a better future for all, emerging markets and developing economies must gain equal access to the investment required to finance this transition.

21) EBRD, European Bank for Reconstruction and Development, 20 September 2024.

Research Article

POLITICAL BARRIERS TO CANADA'S CONTRIBUTION TO TRANS-ATLANTIC ENERGY SECURITY

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Canada is unlikely to play a meaningful direct role in trans-Atlantic energy security. Despite the presence of large energy reserves on Canadian territory, political barriers prevent the construction of energy export infrastructure oriented toward the Atlantic. These barriers include the special role of Quebec within the Canadian confederation, uncertainty over the treatment of GHG emissions in Canadian regulatory processes, and political influence over the impact assessment process.

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Change, Security, and Sustainability in Energy

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In August 2022, German Chancellor Olaf Scholz made a high-profile visit to Canada, flanked by an array of German CEOs. The central reason for the visit was to discuss how Canada could help shore up German energy security.[1] Following the Russian invasion of Ukraine, Germany's longstanding reliance on Russian natural gas had proven to be short-sighted. Canada was a promising option as Germany surveyed the world for alternate natural gas suppliers. Canada possesses enormous energy resources and an active energy industry. In June 2022, Scholz spoke with Canadian Prime Minister Justin Trudeau about the possibility of exporting LNG from Canada's East Coast on the sidelines of that year's G7 Summit.

Proved Canadian natural gas reserves are estimated at over 5,200 billion cubic meters,[2] enough to cover pre-invasion European gas consumption for 12 years. Canada produced 188 billion cubic meters of natural gas in 2022, making it the fifth-largest gas producer in the world after the United States, Russia, Iran, and China.

Unlike China and Iran, Canada is a member of several Western military, political, and economic institutions aligned against Russian aggression. Canada is a founding member of the North Atlantic Treaty Organization and the G7 group of major economies. Furthermore, Canada and the European Union approved the Comprehensive Economic and Trade Agreement in 2017, bringing Canada closer to Europe on trade. These factors should have helped ensure alignment with Germany and other European countries on energy security.

Despite these benefits, the German visit did not provide a path for Canada to become a strong energy security partner to Europe. Instead, the agreements that came out of the visit focused on long-term plans around the export of Canadian hydrogen and critical minerals.

While geography plays a role, political barriers are the main reason for Canada's limited participation in Trans-Atlantic energy security. The construction of major new energy infrastructure to bring Western Canadian energy to the Atlantic is hindered by three main factors: the politics of federalism in Québec, uncertainty about the treatment of emissions in regulatory processes, and the politicization of environmental impact assessments.

Canada's Current Role in Trans-Atlantic Energy Security

Canada currently plays a minor role in supplying energy to the European Union and

1) Prime Minister of Canada. 2022. "Chancellor of Germany Olaf Scholz to Visit Canada." 23 August 2022. https://www.pm.gc.ca/en/news/news-releases/2022/08/13/chancellor-germany-olaf-scholz-visit-canada

2) U.S. Energy Information Administration. 2024. "Country Analysis Brief: Canada". 30 May 2024. https://www.eia.gov/international/content/analysis/countries_long/Canada/pdf/Canada_FY2024.pdf

the United Kingdom, contributing around 1 percent of total EU oil supply and 3.6 percent of total UK oil supply. Most of Canada's oil exports to the European Union and the United Kingdom are sourced from offshore oil fields in Newfoundland and Labrador, which in 2023 produced just over 200 thousand barrels per day of crude oil.[3]

Total EU oil consumption stood at around 331 million metric tons in 2022.[4] According to Eurostat data, Canada exported around 3.4 million metric tons of crude oil and petroleum products[5] to the European Union in 2020. For comparison, the United States exported more than 52 million metric tons of oil to the European Union in the same year. Canada has a larger role in the United Kingdom, contributing around 1.8 million metric tons of the UK's 50.1 million tons of total supply in 2023.[6]

Infrastructure constraints limit the role of Western Canada's vast oil fields in Trans-Atlantic energy security. Canada's incumbent crude oil export pipeline system is primarily meant to supply the U.S. Midwest. Today, the only route for Western Canadian oil to reach the Atlantic is via American pipelines to the U.S. Gulf Cost.

Canada does not export electricity to Europe due to the cost and technical difficulty of laying submarine power cables across the Atlantic. Canada also does not export natural gas to Europe, since it lacks the infrastructure to transport Western Canadian natural gas to the Atlantic, liquefy it, and ship it across the ocean.

The Case of Énergie Saguenay

The Énergie Saguenay LNG project's fate illustrates the barriers preventing Canada from playing a larger role in Trans-Atlantic energy security. Énergie Saguenay was a natural gas liquefaction facility and export terminal proposed by the company GNL Québec near Saguenay, Québec. The facility would have had a production capacity of 10.5 million metric tons of LNG per year, equivalent to around 14.3 billion cubic metres of natural gas, sourced from Western Canada through a 780-kilometre pipeline connected to the Trans-Canada gas pipeline.

The project aimed to export Canadian natural gas to Europe,[7] and the project seemed

3) Government of Canada, Canada Energy Regulator. 2024. "CER – Provincial and Territorial Energy Profiles – Newfoundland and Labrador." 10 September 2024. https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-newfoundland-labrador.html

4) EuroStat. 2024. "Oil and petroleum products - a statistical overview". 15 April 2024. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Oil_and_petroleum_products_-_a_statistical_overview

5) Eurostat. 2024. "Imports of oil and petroleum products by partner country". 27 July 2024. https://ec.europa.eu/eurostat/databrowser/view/NRG_TI_OIL__custom_2062566/bookmark/table?lang=en&bookmarkId=4317bdd7-0b35-43e9-a56e-38c5a7545ab8

6) "Energy Trends: UK Oil and Oil Products." 2024. GOV.UK. 26 September 2024. https://www.gov.uk/government/statistics/oil-and-oil-products-section-3-energy-trends

7) LNG Prime Staff. 2021. "Germany's Hanseatic Plans to Import Canadian LNG." LNG Prime. 4 June 2021. https://lngprime.com/americas/germanys-hanseatic-plans-to-import-canadian-lng/21635/

like an excellent fit for European energy security. In 2013, when the project was first proposed, Europe imported most of its LNG from three countries: Algeria, Nigeria, and Qatar.[8] The three countries posed energy security concerns for Europe: Algeria over the diplomatic status of the Western Sahara, Nigeria with its industry's intermittent outages, and Qatar because of its often-tense relations with its neighbors. Canada, by comparison, is a stable Western democracy.

Énergie Saguenay was planned to be built on industrial land in the Port of Saguenay, a deepwater port servicing dozens of commercial ships per year[9] exporting bulk commodities to Europe. The port is close to major road infrastructure and has a skilled local industrial workforce owing to the local forestry and aluminum industry. From a climate perspective, GNL Québec made efforts in its plans to reduce emissions, including the unusual step of using hydroelectric power to run its liquefaction units rather than natural gas.

Most importantly, the project had received the political support of the Government of Québec. In the years between 2015 and 2017, Québec offered a series of investment incentives including a special industrial rate on electricity, accelerated land sales, preferential tax treatment, and eventually offers to invest in the project in 2016, 2017, and 2020. The Québec government voiced public support for the project. In February 2020, Coalition Avenir Québec (CAQ) leader and Québec Premier François Legault affirmed his view that the project would bring net environmental benefits: «Si on réussit à remplacer un certain nombre de ces usines au charbon par des usines au gaz liquéfié, on va réduire les GES, ça va aider la planète.[10]» [If we succeed in replacing a certain number of these coal-fired plants with liquefied gas plants, we will reduce GHGs, it will help the planet.]

However, in December 2020, the Government of Québec pulled funding for Énergie Saguenay. In March 2021, citing a critical report from environmental impact assessment agency Le Bureau d'audiences publiques sur l'environnement (BAPE), Québec Environment Minister Benoit Charette indicated that the project did not meet three conditions: social acceptability, promoting the energy transition, and contributing to GHG emissions reductions. Then, in July 2021, the project was formally rejected by the Government of Québec.[11] This decision was followed

8) Victoria Zaretskaya, Chris Peterson, and Warren Wilczewski. 2022. "Three Countries Provided Almost 70% of Liquefied Natural Gas Received in Europe in 2021 - U.S. Energy Information Administration (EIA)." 22 February 2022. https://www.eia.gov/todayinenergy/detail.php?id=51358

9) Port of Saguenay. 2023. "2022 Annual Report". N.d. https://portsaguenay.ca/donnees/protected/rapport/files/Port%20Saguenay%20Rapport%20Annuel%20Anglais_LR%284%29.pdf

10) Carabin, François. 2021. "GNL Québec: Des Citations Qui Prouvent Que Le Gouvernement a Complètement Changé D'idée." Le Journal De Québec, 21 July 2021. https://www.journaldequebec.com/2021/07/21/gnl-quebec-des-citations-qui-prouvent-que-le-gouvernement-a-completement-change-didee-1

11) Jacob Serebrin, The Canadian Press. 2021. "Quebec Rejects $14B Natural Gas Project in Saguenay Over Environmental Issues." Global News, 21 July 2021. https://globalnews.ca/news/8048493/quebec-rejects-14b-natural-gas-project-saguenay/

by another critical report from the Federal environmental impact assessment body, the Impact Assessment Agency of Canada (IAAC), and subsequent formal rejection by Federal Environment Minister Stephen Guilbault[12] in February 2022.

In 2023 the U.S.-based parent of GNL Québec filed a request for international arbitration with the World Bank's Institution of Conciliation and Arbitration Proceedings. The company accused the Canadian Government of violating the foreign investment safeguards in NAFTA. In the request, the company claimed that the environmental review process involved "improper intervention of Québec politicians at the highest levels", which interrupted the normal regulatory work of BAPE with a set of last-minute regulatory changes aimed at "supplying the government with motives to refuse the Project it no longer wished to approve".[13]

Unfortunately for GNL Québec, politics had shifted against the project. As Énergie Saguenay moved through the regulatory process, a coalition of local opposition groups, Indigenous groups and environmental NGOs rallied public opposition. In December 2020, a Leger poll found that 46 percent of respondents were opposed to the project, while 33 percent were in favour.[14] All Québec opposition parties, including the Liberal party which initially attracted the investment, soon came out against Énergie Saguenay. With an election set for October 2022, the CAQ decided that the local economic benefits were not worth the political damage of allowing the project to proceed.

The Role of Politics in Permitting Canadian Energy Infrastructure

The chain of events surrounding Énergie Saguenay highlights the current toxic politics surrounding new energy infrastructure in Canada, and the ensuing effect on regulatory processes. The unique place of the Province of Québec in the Canadian confederation, uncertainty about how emissions outside of the control of the project affect regulatory decision-making, and the politicization of Canadian environmental assessment processes all function as barriers to this infrastructure. These barriers limit Canada's ability to contribute to the energy security of our trans-Atlantic allies and partners.

For historical reasons, Québec holds a special place among the provinces of Canada.

12) Impact Assessment Agency of Canada. 2023. "Government of Canada Releases the Final Decision on the Énergie Saguenay Project." Government of Canada, 8 June 2023. https://www.canada.ca/en/impact-assessment-agency/news/2022/02/government-of-canada-releases-the-final-decision-on-the-energie-saguenay-project.html

13) International Centre for the Settlement of Investment Disputes. 2023. "Ruby River Capital LLC. V. Canada". World Bank Group. 17 February 2023. https://icsidfiles.worldbank.org/icsid/ICSIDBLOBS/OnlineAwards/C11097/DS18460_En.pdf

14) Patrice Bergeron. 2020. "Québec ne fait « aucun effort » pour favoriser le projet". La Presse, 2 December 2020. https://www.lapresse.ca/actualites/politique/2020-12-02/sondage-sur-gnl-quebec/quebec-ne-fait-aucun-effort-pour-favoriser-le-projet.php

Francophone nationalism is a powerful force in Québec. Starting with the Quiet Revolution in the 1960s, Québecois society has increasingly exerted its autonomy from Anglophone Canada. Today, the explicitly sovereigntist Provincial and Federal political parties, the Parti Québécois and the Bloc Québécois, are powerful forces in Canadian politics. As a result, while the Federal government may act with more force on energy policy elsewhere such as when it pushed forward with the Trans Mountain pipeline despite opposition from the Government of British Columbia,[15] it acts with caution on matters which may inflame tensions in Québec.

The structure of Québec's energy system is equally important. Owing to its distance from productive natural gas reservoirs, Québec does not have an extensive natural gas grid. Heating in Québec is instead mostly baseboard electric heaters and diesel-fueled furnaces.[16] This is why Énergie Saguenay required a 780-kilometer pipeline to connect to Ontario's natural gas grid. With little incumbent infrastructure and no way to avoid going through Québec, the province can effectively veto Western Canadian energy reaching the Atlantic.

A second major political barrier is uncertainty over treatment of emissions in major projects because of influence over regulatory processes by Canadian and international environmental non-governmental organizations (ENGOs). Canada is home to a powerful set of such organizations, including Équiterre, the David Suzuki Foundation, Greenpeace Canada, and the Québec Association of Physicians for the Environment. These organizations quickly organized in resistance to the Énergie Saguenay project and its associated pipeline, spreading similar messages about the negative impact on the climate, as well as highlighting the impact on local wildlife such as beluga whales. The groups[17] collectively[18] proposed[19] that the project should be responsible not only for the direct emissions from its operations but also upstream emissions from natural gas production in Alberta and downstream emissions from combustion of the natural gas in Europe and elsewhere. The inclusion of Scope Three

15) Lindsay, Bethany. 2019. "B.C. Premier Disappointed by Approval of Trans Mountain Expansion." CBC, 19 June 2019. https://www.cbc.ca/news/canada/british-columbia/trans-mountain-decision-bc-reaction-1.5180363

16) Government of Canada, Statistics Canada. 2022. "Primary Heating Systems and Type of Energy." 12 December 2022. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=38100286012

17) "Quebec Climate Wins - David Suzuki Foundation." 2022. David Suzuki Foundation. 21 September 2022. https://davidsuzuki.org/story/quebec-climate-wins/#:~:text=Getting%20out%20of%20GNL/Gazoduq,Thank%20you

18) Loujain Kurdi, 2020. "What GNL Québec Is and Why You Must Block the Project. - Greenpeace Canada." Greenpeace Canada. 28 July 2020. https://www.greenpeace.org/canada/en/press-release/41055/what-gnl-quebec-is-and-why-you-must-say-no-to-it/

19) Equiterre. 2019. "GNL Québec – What You Need to Know" 11 April 2019. https://www.equiterre.org/en/articles/news-gnl-quebec-what-you-need-to-know

emissions was a major area of focus[20] in ENGO submissions[21] to environmental impact assessment bodies.

The influence of ENGOs is obvious in the Impact Assessment Agency of Canada report rejecting the Énergie Saguenay project. On page 38 of the final impact assessment report, the IAAC highlighted the role of ENGOs in expanding consideration of Scope Three GHGs.[22] It is best practice to restrict impact assessments to the direct impacts of a project, including the project's direct greenhouse gas emissions and local environmental and sociological impacts in the area. The reason for this is to reduce regulatory burden in the spirit of "one project, one assessment."[23] Consideration of Scope Three emissions will inevitably hold each project as responsible for the environmental impacts of the entire supply chain and subject every project to dozens of environmental impact assessments.

Regardless, in 2016 the Canadian Federal Government introduced new guidance on environmental impact assessment which required assessment of upstream GHG emissions.[24] As a result, upstream emissions from natural gas production – a factor completely out of the control of GNL Québec – are considered in the final IAAC report. On page 48 of its report, the IAAC concludes that the project would represent 10 percent of Québec's greenhouse gas emissions.[25] These emissions are not in Québec; instead, they are located mostly in Alberta and British Columbia. In October 2023 the Supreme Court of Canada found that the Impact Assessment Act was unconstitutional,[26] because IAAC impact assessments interfered with Provincial jurisdiction over energy. The courts are currently considering the impact on this ruling on IAAC upstream emissions assessments.

Further, the IAAC report also analyzed downstream greenhouse gas emissions from the

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20) Equiterre. 2020. "Dévelopment de l'industrie de gaz fissile: comment investor dans le passé". October 2020. https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-80115/comment-55940/equiterre_bape_energiesaguenay.pdf

21) Greenpeace Canada. 2020. "GNL Quebec: à quel prix?" October 2020. https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-80115/comment-55991/d70492d4-22.10.2020_me%CC%81moire-sur-gnl-que%CC%81bec_-version-finale-fr.pdf

22) Government of Canada, Impact Assessment Agency of Canada. 2021. "Energy Saguenay Project Environmental Assessment Report". November 2021, 2.

23) Government of Canada, Impact Assessment Agency of Canada. 2022. "Cooperative Impact Assessments". Government of Canada. 26 January 2022. https://www.canada.ca/en/impact-assessment-agency/corporate/acts-regulations/legislation-regulations/cooperative-impact-assessments.html

24) Government of Canada, Natural Resources Canada. 2016. "Government of Canada Moves to Restore Trust in Environmental Assessment". 27 January 2016. https://www.canada.ca/en/natural-resources-canada/news/2016/01/government-of-canada-moves-to-restore-trust-in-environmental-assessment.html

25) Government of Canada, Impact Assessment Agency of Canada. 2021. "Energy Saguenay Project Environmental Assessment Report". November 2021. https://iaac-aeic.gc.ca/050/documents/p80115/142710E.pdf

26) Maureen Killoran, Sander Duncanson, Brodie Sutherland, Sean Naga, Ankita Gupta and Marleigh Dick, 2023. "Supreme Court of Canada finds the federal Impact Assessment Act unconstitutional". Osler Hoskin & Harcourt LLP. 13 October 2023. https://www.osler.com/en/insights/updates/supreme-court-of-canada-finds-the-federal-impact-assessment-act-unconstitutional

Énergie Saguenay project, even though the Canadian Federal Government explicitly does not require assessment of downstream GHG emissions.[27] Emissions from burning the natural gas are the responsibility of the country where the natural gas is burned,[28] according to the UN Paris Agreement.

In its analysis, the IAAC argues that the Énergie Saguenay project would contribute to higher global GHG emissions. In coming to this conclusion, on page 42 the IAAC cites the International Energy Agency's 2021 Net Zero Emissions Roadmap's claim that no additional oil and gas infrastructure would be necessary in a net-zero emissions world.[29] It is unclear why the IAAC would use IEA Net Zero modeling in its analysis, since the IEA has said explicitly that Net Zero modeling is aspirational, and blocking oil and gas infrastructure before demand falls is a recipe for an energy security crisis.[30]

The IAAC concludes by stating that downstream emissions from Énergie Saguenay are outside of the scope of the analysis, raising the question of why this was analyzed, and how this analysis affected decision-making in the IAAC. This is especially concerning given the extent to which the IAAC followed the lead of Québec's BAPE, even quoting the Quebec regulator's position that "the implementation of new natural gas exchange infrastructure could be an obstacle to the energy transition in the markets targeted by the participant".[31]

A third, related issue concerns the transformation of environmental impact assessments from a regulatory process into a political process. The legislation that established the Impact Assessment Agency of Canada in 2019 dramatically broadened political decision-making in regulatory processes. The previous environmental impact legislation ensured that decisions would only be delegated to cabinet-level officials in cases where significant adverse effects were considered likely.

The 2019 Impact Assessment Act reallocated decision-making away from the regulatory body and towards the Minister of Environment and Climate Change. Under the current processes, if the IAAC finds any adverse effects, then the final decision is given to political actors to determine whether the project is in the "public

27) Government of Canada, Service Canada. 2020. "Strategic Assessment of Climate Change." Government of Canada. 6 October 2020. https://www.canada.ca/en/services/environment/conservation/assessments/strategic-assessments/climate-change.html

28) United Nations. 2016. "Paris Agreement". 14 March 2016. https://treaties.un.org/doc/Treaties/2016/02/20160215%2006-03%20PM/Ch_XXVII-7-d.pdf

29) Government of Canada, Impact Assessment Agency of Canada. 2021. "Energy Saguenay Project Environmental Assessment Report". November 2021. https://iaac-aeic.gc.ca/050/documents/p80115/142710E.pdf

30) Bordoff, Jason and McNally, Robert. 2024. "Recapping a (Respectful) Dialogue About IEA Analysis". Columbia University Center on Global Energy Policy. 22 March 2024. https://www.energypolicy.columbia.edu/recapping-a-respectful-dialogue-about-iea-analysis/

31) Government of Canada, Impact Assessment Agency of Canada. 2021. "Energy Saguenay Project Environmental Assessment Report". November 2021. https://iaac-aeic.gc.ca/050/documents/p80115/142710E.pdf

interest".[32] This effectively establishes political veto power over all major projects in Canada.

Additionally, the 2019 Impact Assessment Act dramatically expanded participation rights for intervenors. Whereas the previous legislation limited participation in hearings and review panels to people directly affected by the project or with special subject matter expertise, the current legislation eliminated these limits. As a result, people and organizations from across Canada have standing to give their opinions on any major project,[33] regardless of the relevance of their input. As a result, the regulatory process has been transformed into a platform for ENGOs to grandstand their broad policy positions.

The problem with politicization of this process is obvious: as Énergie Saguenay demonstrates, the politicization of approvals makes planning for major projects impossible. The political atmosphere can whipsaw remarkably fast, introducing a level of investment uncertainty that will dissuade any investor. Since the new legislation was enacted, just one project has been approved by the IAAC,[34] Cedar LNG on Canada's West Coast – a relatively small project with indigenous ownership.

In summary, the political role of Québec within Canadian federalism complicates the construction of energy infrastructure throughout the province. In addition, the expansive treatment of emissions in regulatory assessment closes the door on most major projects. And finally, the politicization of the environmental impact assessment process introduces enormous uncertainty into investment, undermining energy system planning.

What About Hydrogen?

The European Union often cites hydrogen produced through the electrolysis of water with renewable energy as a central pathway for decarbonizing its heavy industry. In 2022, Canada and Germany signed a non-binding declaration of intent for Canada to begin exporting Canadian hydrogen to Germany beginning in 2025. This is unlikely to be an important development for trans-Atlantic energy security.

The global hydrogen market has been disappointing. The Oxford Institute for Energy

32) Bishop, Grant and Sprague, Grant. 2019. "A Crisis of Our Own Making: Prospects for Major Natural Resource Projects in Canada". CD Howe Institute. February 2019.
https://www.cdhowe.org/sites/default/files/2024-01/Commentary_534.pdf

33) Kai Alderson, Bridget Gilbride, Emile Bundock, and Stephanie Sanger. 2019. "The New Federal Impact Assessment Act". Fasken LLP, 28 August 2019.
https://www.fasken.com/en/knowledge/2019/08/the-new-federal-impact-assessment-act

34) Heather Exner-Pirot, 2024. "Canadian Competitiveness in Resource Development – a Post-Mortem". Macdonald-Laurier Institute. 3 May 2024. https://macdonaldlaurier.ca/canadian-competitiveness-resource-development-post-mortem-heather-exner-pirot-commentary/

Studies estimates that European green hydrogen demand may reach 2-3.8 million metric tons by 2030,[35] far below the 20 million metric ton EU target. As a result, many planned green hydrogen production facilities have been scaled back or canceled.[36]

This creates problems for Canadian hydrogen export. World Energy GH2 plans to produce around 0.2 million metric tons of hydrogen per year from its project in Newfoundland, and EverWindFuels plans to produce a similar amount from its project in Nova Scotia. It is questionable whether these two projects will be able to compete in the small European green hydrogen market, given the high costs of converting the hydrogen to ammonia, shipping this ammonia to Europe, and then re-converting the ammonia back into hydrogen.[37] It will almost certainly be cheaper for the EU to manufacture its own hydrogen closer to home.

For comparison, Énergie Saguenay's capacity of 10.5 million metric tons of LNG is equivalent to more than 15 times the combined energy export capacity of the two planned Canadian green hydrogen and ammonia projects.

Concluding Remarks

Canada plays a small role in trans-Atlantic energy security. If Equinor's Bay du Nord project proceeds, Canada's role in European oil markets could grow by up to 200 thousand barrels per day,[38] a significant but still relatively minor role. Canada is unlikely to play a role in European green energy. Engineering and cost hurdles will block trans-Atlantic trade of electricity and hydrogen.

Canadian oil and natural gas in the provinces of Alberta, British Columbia, and Saskatchewan are unlikely to play a major direct role in trans-Atlantic energy security in the short to medium term. Political barriers to building energy infrastructure in the Atlantic will prevent Canadian energy from flowing to Europe. The combination of Québec's special place in the Canadian confederation, uncertainty around the treatment of GHGs in regulatory processes, and the politicization of the impact assessment process undermine Canada's ability to assist our Trans-Atlantic allies and partners on energy security.

35) Martin Lambert, Alex Barnes, Andrei Marcu, Olivier Imbault, Adithya Bhashyam, Martin Tengler, Chiara Cavallera, and Gabrielle Romeo, 2024. "2024 State of the European Hydrogen Market Report". June 2024. https://www.oxfordenergy.org/wpcms/wp-content/uploads/2024/06/2024-State-of-the-European-Hydrogen-Market-Report.pdf

36) Will Mathis, 2024. "Green Hydrogen Hype Fades as High Costs Force Project Retreat ". Bloomberg. 3 October 2024. https://www.bloomberg.com/news/articles/2024-10-03/green-hydrogen-hype-fades-as-high-costs-force-project-retreat

37) Michael Liebreich, 2022. "The Unbearable Lightness of Hydrogen". BloombergNEF, 12 December 2022. https://about.bnef.com/blog/liebreich-the-unbearable-lightness-of-hydrogen/

38) Ashok Dutta, 2023. "Equinor unveils drilling program for 200,000 b/d Bay du Nord Canadian oil project". S&P Global Commodity Insights, 14 August 2024. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/oil/081423-equinor-unveils-drilling-program-for-200000-bd-bay-du-nord-canadian-oil-project

Despite the lack of direct trans-Atlantic energy trade, Canada nevertheless plays a crucial role in global energy security. Canada supplies enormous quantities of oil and natural gas to the United States. With the assurance provided by Canadian energy, the United States can leverage its impressive trading infrastructure in the Gulf of Mexico to export LNG and oil. Most of these exports are destined for Europe[39] and have played a central role in allowing Europe to extricate itself from Russian energy. With the opening of the Trans Mountain Pipeline earlier this year and next year's planned opening of LNG Canada, energy from Western Canada will solidify the energy security of Canada's partners and allies in Asia, and, through them provide greater stability and certainty to global energy security.

39) Matthew French, 2024. "U.S. crude oil exports reached a record in 2023". U.S. Energy Information Administration, 18 March 2024. https://www.eia.gov/todayinenergy/detail.php?id=61584

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Research Article

THE EUROPEAN PARLIAMENT ELECTIONS AND THE FUTURE OF THE EUROPEAN GREEN DEAL

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This article aims to analyze the results of the European Parliament elections held on 6-9 June 2024. The distribution of seats in the Parliament is related to the future of the Green Deal. The Greens lost some seats, which will mostly have the capacity to affect the implementation or development of the green agenda. The key factors behind these results are economy, migration, security, and war. After the elections, the Parliament elected Ursula von der Leyen as the President of the Commission with 401 votes in favor. The Greens and EFA group voted for Ursula von der Leyen because they received a promise that the Green Deal would continue as planned. This article argues that the EU must be loyal to targets regarding the green agenda in order to become independent of any foreign power in terms of energy resources.

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Keywords: Energy, European Parliament Elections, Green Deal, Green Agenda.

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Change, Security, and Sustainability in Energy

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The European Parliament elections were held in a highly problematic political atmosphere on 6-9 June 2024. While the Russia-Ukraine War is a big burden on the shoulders of European nations in terms of security, migration and economic issues are used by European far-right parties as a tool for political campaign. The Greens lost some votes in the Parliament in the 2024 elections, but they voted for Ursula von der Leyen for the post of the Presidency of the Commission. It is fair to say that the decline of voices supporting green policies in the Parliament may have dire consequences for the green agenda. Still, Ursula von der Leyen promised that a green agenda would be implemented. If far-right groups increase their share of votes and seats in the Parliament, it will be the end of the Green Deal, which is the most important future project of the EU. This article tries to mention three things. First, the decline of seats is bad for the Greens and EFA group. Second, with Leyen's election to the Presidency of the Commission, there is hope for the future of the Green Deal. Third, the EU must increase and implement green policies to become a neutral geography regarding dangerous climate effects and independent of any foreign supplier power.

The European Green Deal

For the European Union, adopting green energy policies is very important for the future. Energy is generally perceived as an issue related to the future of the European nations. For a safer world and Europe, the EU aims to battle the global climate crisis. In 2019, the European Parliament issued an emergency statement. With this statement, the European Parliament demanded that the European Commission take strict measures against the global climate crisis so that reaching and sustaining 1,5 Celsius degrees can be achievable for the EU member states to decrease the effects of the global climate crisis. After this demand, the European Commission announced the European Green Deal, aiming to make Europe an eco-friendly geography as a whole by 2050. To consolidate efforts for a greener continent, on 24 June 2021, the EU Climate Law was introduced by the Parliament. This law demands that a 55 percent decrease in emissions will be achieved by 2030. In addition to this target, the EU aims to reach the point of neutrality regarding dangerous climate effects by 2050. The EU aims to create a system that decreases the hazardous effects of carbon emissions.[1] Also, it is said that with the accomplishment of these targets, the life quality of the European citizens will improve drastically.[2]

In 2023, the European Union introduced a new set of climate legislation to achieve

1) Serena et al., "The European Green Deal: Challenges and opportunities for the Southern Mediterranean," *Mediterranean Politics*. https://doi.org/10.1080/13629395.2023.2237295

2) European Parliament, "Green Deal: key to a climate-neutral and sustainable EU," https://www.europarl.europa.eu/topics/en/article/20200618STO81513/green-deal-key-to-a-climate-neutral-and-sustainable-eu

its aims for 2030. These laws are defined as the Fit for 55. This law package includes thirteen amended laws and six laws on climate issues. European politicians are trying to decrease the percentages of emissions, create a new system based on equal responsibility between member states, and increase the percentage of renewable energy consumption. The Parliament passed a fund called Social Climate Fund for green transition that governments plan. With these policies, the EU is planning to make Europe less dependent on foreign powers and a neutral geography in terms of energy consumption.[3] The Green Deal will have a systematic budget. The financing for the project will be made by the Next Generation EU Recovery Plan and the seven-year EU budget. Until 2030, it is planned that three billion trees will be planted within the borders of the EU.[4]

European politicians, who support green transformation, generally speak in favour of the project. According to Pascal Canfin, who is a member of the Renew Europe Group in the European Parliament, Europe is undergoing a complete transformation that was never realized in the past. Infrastructures that are being built today will be available for the use of future generations. With this transformation, Europe will have a decarbonized economic model. Europeans are living in a historic moment now.[5] European green policies are essential for politicians supporting green future for European nations.

Results of the European Parliament Elections

The elections for the European Parliament deserve to be assessed. The group of the European People's Party gained 188 seats. They are the leader in terms of the number of seats. S&D (the Progressive Alliance of Socialists and Democrats) won 136 seats. They are the second biggest group in the Parliament. Patriots for Europe gained 84 seats. The list of results can be seen below:

European People's Party – 188 seats,

Progressive Alliance of Socialists and Democrats – 136 seats,

Patriots for Europe – 84 seats,

European Conservatives and Reformists – 78 seats,

Renew Europe – 77 seats,

3) European Parliament, "Green Deal: key to a climate-neutral and sustainable EU,".

4) European Commission, "The European Green Deal," https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

5) La Tribune, Pascal Canfin, «Avec le Green Deal, l'Europe opère la plus grande transformation économique jamais réalisée», https://www.latribune.fr/economie/union-europeenne/avec-le-green-deal-l-europe-opere-la-plus-grande-transformation-economique-jamais-realisee-pascal-canfin-976881.html

Greens / European Free Alliance – 53 seats,

Left – 46 seats,

Non-attached – 33 seats,

Europe of Sovereign Nations – 25 seats.[6]

One of the most important results of the elections is that the Greens lost seats in 2024. In the previous election, the group had 70 seats in the Parliament. However, in 2024, they lost 17 members by taking 53 seats in the Parliament.[7] This result shows that green policies and political campaigns focusing on climate issues are not as attractive as other political promises that brought votes to the first three party groups in Parliament. However, this evaluation is only valid for 2024 elections. The decline of votes is felt strongly in Germany and France, the two countries including the most ecologist European deputies in the 2019-2024 period. In 2024, the Greens gained 15 seats in Germany and 5 seats in France. In the Netherlands, the Greens gained 6 seats. In terms of numbers, the Netherlands exceeded the number of seats of France. It is a meaningful change. Compared to the previous period, in 2019, Greens gained 24 seats in Germany and 12 seats in France.[8] There is a sharp decline in their votes.

According to Phuc-Vinh Nguyen, who is a researcher at the Jacques Delors Institute, in 2019, the Greens surprised many people by having an important share of votes. However, the political atmosphere has been undergoing a strong change since that time. Nguyen states that the Russia-Ukraine War started, intensifying the continent's security discourse. Also, the increase in prices negatively affected people. Right-wing or far-right parties instrumentalized environmental politics during the agricultural crisis. These can be reasons behind such a change. It is a defeat for the Greens.[9] These results have the potential to affect the implementation of the Green Deal.

The European Parliament Elections and the Future of the European Green Deal

The results of the European Parliament elections must be analysed to understand Europe's future decarbonization aims. After seeing the results of the Parliament elections, it is possible to say that those, who do not want to make far-reaching reforms in the field of energy and climate, are gaining stronger ground in European politics. Financial problems and security can be defined as the main factors behind this change. This can negatively affect the implementation of the Green Deal in the near future.

6) European Parliament, "2024 European Election Results," https://results.elections.europa.eu/en/index.html

7) European Parliament, "European Parliament 2019-2024," https://results.elections.europa.eu/en/european-results/2019-2024/outgoing-parliament/

8) For more information, please check and see the website of the Parliament. See https://results.elections.europa.eu/en/seats-political-group-country/2019-2024/outgoing-parliament/

9) Les Echos, «Européennes 2024,» Phuc-Vinh Nguyen, https://www.lesechos.fr/monde/europe/les-verts-europeens-perdent-un-quart-de-leurs-eurodeputes-2100254

After economic problems emerged inside the EU borders and energy costs increased, farmers demonstrated against the green policies of the EU. Especially, after Russia occupied Ukraine, security discourse emerged in a stronger way in European politics.

Moreover, inflation rates aggravated the situation. Some political leaders have negatively approached the green agenda in recent years. Italian Prime Minister Giorgia Meloni does not support strong environmental discourse in the EU. Also, she does not want to implement far-reaching environmental reforms. In addition to her, in the last year, French President Emmanuel Macron demanded that green policies should come to a stop for a moment. The Greens lost votes in the elections, so in the future, it can be argued that implementation of the Green Deal may have difficulties and may face some problems in diversifying barriers against the green agenda.[10]

The decline of the Greens' votes shows that right-wing groups such as European Conservatives and Reformists and Identity and Democracy will take a more leading role. These groups do not support the Green Deal, but they want to implement regional initiatives to solve climate issues and define decarbonization efforts as a utopianism. According to one argument, the Parliament in which party groups other than the Greens are stronger cannot sustain green agenda and will prevent sustainable implementation of the Green Deal. As a consequence, it can be stated that emissions cannot be decreased as it is planned. It can be stated that the implementation of the Green Deal will face problems or difficulties in the near future. The Green Deal can continue despite the fact that green agenda lost some supporters in the Parliament. However, it will have a narrower place in the minds of right-wing politicians. It can be stated that the green agenda was not attractive at the EU and national levels. Furthermore, the results of the Parliament elections are a shattering blow to the future of green agenda.[11]

Italian Prime Minister Giorgia Meloni says that the current green agenda does not consider Europe's welfare. It will make the EU more dependent on China by harming the European automobile industry.[12] After these results, gathering support for the Green Deal will become more difficult. According to Jessica Haak, a scholar at Hamburg University, the results of elections show the importance of migration, economy, and war.[13] In the near future, these trends will have the capacity to shape the politics of the EU. Accordingly, actions of the Parliament may be less based on green policies. However, Ursula von der Leyen was elected as the President of the Commission with 401 votes in favour despite the fact that the Parliament includes

10) Atlantic Council, "Green Deal Fatigue?" https://www.atlanticcouncil.org/blogs/new-atlanticist/how-the-european-parliament-elections-could-affect-eu-climate-policies/

11) Atlantic Council, "Green Deal Fatigue?".

12) Politico, "Italy's Meloni Denounces 'Ideological Madness' of EU Ban on Gas and Diesel Cars," https://www.politico.eu/article/italys-meloni-denounces-ideological-madness-of-eu-ban-on-gas-and-diesel-cars/

13) Guardian, "Fears for Green Deal as number of MEPs from Climate-Denying Parties Set to Rise," https://www.theguardian.com/world/article/2024/jun/10/eu-parliament-politicians-climate-denying-parties

more voices that are not supporting a strong green agenda compared to the previous period.[14] The Greens and European Free Alliance voted for Leyen because they received the promise that green agenda would be followed.[15]

Concluding Remarks

As a consequence, it can be stated that the Greens lost some votes in the Parliament. However, with Leyen's election to the Presidency of the Commission, it can be declared that green agenda will continue. The Green Deal is important for two things. First, with the full implementation of green agenda, the EU will use renewable energy and decrease energy costs to realize a greener Europe. Second, energy import will be reduced, and the EU will have an energy structure more independent of any foreign power when compared to the past. Therefore, it should be noted that the EU can shape its foreign policy without concerns about energy suppliers.

14) European Parliament, "Parliament re-elects Ursula von der Leyen as Commission President," https://www.europarl.europa.eu/news/en/press-room/20240710IPR22812/parliament-re-elects-ursula-von-der-leyen-as-commission-president

15) The Greens / EFA, "Greens/EFA Group Vote for von der Leyen," https://www.greens-efa.eu/en/article/press/greens-efa-group-vote-for-von-der-leyen-after-securing-major-wins-for-people-planet

Research Article / Interview

COP29: DECORBANISATION & MILESTONES IN THE SOUTH CAUCASUS RENEWABLES MARKET

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Energy is foundational to the self-perception of states in the South Caucasus. This region's post-Soviet regionalization revolves around the "contract of the century" and the export of fossil fuels to Europe. Türkiye is the biggest regional energy market, striving to balance decarbonization with the objective of maintaining cost-effective energy as an independent variable in the development of a globally competitive manufacturing hub. Azerbaijan is striving to overcome its singular dependence in fossil fuels, while retaining its role as a major energy exporter. Central to Türkiye and Azerbaijan's plans is Georgia, a country that has largely achieved decarbonization but is striving to maintain its role as the region's essential energy transit hub. Finally, Armenia continues to prioritize security over connectivity in the emerging energy landscape. This paper explores the friction of decarbonization with the role of each state in the Caucasus, focusing on milestone project investments in renewables.

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Keywords: Decarbonization, Renewables, Grid, Interconnectors, EU, South Caucasus.

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Change, Security, and Sustainability in Energy

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Baku is hosting the UN Conference of the Parties 29 Summit in November 2024. Thirty years following the "contract of the century" (1994), Baku placed Azerbaijan on Europe's energy map and aspired to take on a role in transforming the energy status quo.[1] The annual meeting has taken place since 1995, to take stock of climate developments and focuses minds on the reduction of greenhouse gases. The objective set in Paris (2015)[2] is reducing global carbon emissions to "net zero" and working to subdue the now undeniable global warming effect to 1,5 degrees Celsius. During the last COP 28, in Dubai, the parties reached the so called "UAE Consensus," namely the need to transit away from fossil fuels. To reach that point, the global economy will have to commit no less than $41 trillion in additional investment, a requirement unlikely to be met at current pace. The "finance summit" in Baku focuses precisely on this funding gap. Azerbaijan aims to push the benchmark of support for developing economies beyond the $100bn a year agreed in 2009.[3] Taking a step back from a global perspective, this paper looks at the South Caucasus, focusing on key energy projects indicative of how regional politics matter in the global picture. The focus is not on "renewables" but on game-changing projects that are significant for the role of the South Caucasus on the broader energy map.

A Regional Perspective to Global Challenges

Worldwide, energy policy politics brings two priorities in friction to the fore: consumption security and environmental sustainability. One of the most significant advances in the energy transition campaign has been operationalizing the principle the "polluter pays" principle.[4] The 'carbon price' notion assumes that states and corporates recognize and internalize the social cost of greenhouse gasses. Corporates and, ultimately consumers will pay a tax designed to penalize the use of fossil fuels and incentivize a rapid decarbonization. That is the window to relativizing the objectives in a regional and national context, making them responsive to the specific

1) "Contract of the Century," Ministry of Energy of the Republic of Azerbaijan. See https://minenergy.gov.az/en/neft/esrin-muqavilesi#:~:text=A%20'Production%20Sharing%20A,historical%2C%20political%20and%20international%20importance; Robert F. Cekuta, "25 Years After 'The Contract of the Century,': the Implications for Caspian Energy," Energy Academic Group, Naval Postgraduate School. See https://nps.edu/web/eag/25-years-after-the-contract-of-the-century-the-implications-for-caspian-energy

2) "What is COP?" McKinsey, 12 August 2024.
See https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-cop

3) "Azerbaijan outlines COP29 priorities, to launch climate finance fund," S&P Global, 17 September 2024.
See https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/091724-azerbaijan-outlines-cop29-priorities-to-launch-climate-finance-fund; "COP29 – Azerbaijan," 11-24 November 2024. See https://www.cisl.cam.ac.uk/cop-climate-change-conference/cop29-azerbaijan-11-24-november-2024; "CP29 – Energy Transition Initiatives". See https://cop29.az/en/green-energy-transition-initiatives

4) "What is the polluter pays principle," 18 July 2022. See
https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-polluter-pays-principle/

circumstances of the economy.[5] The policy assertion is that the cost of transition is ultimately a matter of scale, as investment has a snowball effect, in that technologies deployed at scale become cheaper. To achieve this front-ended investment is required in infrastructure, re-skilling, and rebuilding energy value chains. The skyrocketing of fossil fuels since Russia's invasion of Ukraine triggered inflation, energizing policy resolve to achieve a transition away from fossil fuels.[6] In this scheme, Azerbaijan finds itself in a peculiar position.

On the one hand, the country is uniquely situated to benefit from its role as an alternative to Russia's producer of fossil fuels. On the other hand, the country faces an existential challenge given its reliance on fossil fuels. With the exception of the UAE, there is no country reliant on fossil fuels that is clearly en route to transition to a more diversified economy.

Azerbaijan's role as an alternative source of natural gas for Europe is particularly important to Southeast Europe, Italy and, perhaps in time, Central Eastern Europe.[7] At present, this partnership is fundamental for the European Single Market, which in losing Russian supplies sustained a massive erosion in its manufacturing competitiveness, resulting in massive divestment.[8] Until the invasion of Ukraine, natural gas had been considered a competitively priced "transitional fuel," with lower emissions and at competitive pricing. The sudden price hike pressed many states to reinstate coal fire infrastructure and seek new energy partners for the short-to-medium term, including Azerbaijan. Baku's relies on fossil fuel exports for exports and domestic consumption.[9] As argued by Atlantic Council analysts John Roberts and Julian Bowden, Azerbaijan wants to maintain or scale up exports to take full advantage of current high energy prices, but oil supply is dwindling and proven natural gas reserves cannot reach the market without additional investment, which has not been forthcoming. Regulation over methane leaks may soon mount pressure on states to step away from natural gas, further accelerating divestment from fossil fuels.[10] Baku is looking to substitute domestic electricity consumption

5) Hayley Dunning, "Kenya launches 2050 Calculator to advance climate change mitigation," Imperial, 22 July 2022. See https://www.imperial.ac.uk/news/238438/kenya-launches-2050-calculator-advance-climate/; "Decarbonising the energy system by 2050 could save trillions – new Oxford study," University of Oxford, 14 September 2022. See https://www.ox.ac.uk/news/2022-09-14-decarbonising-energy-system-2050-could-save-trillions-new-oxford-study

6) Mekala Krishnan et. al, "The economic transformation: what would change in the net-zero transition," McKinsey, 25 January 2022. See https://www.mckinsey.com/capabilities/sustainability/our-insights/the-economic-transformation-what-would-change-in-the-net-zero-transition

7) "Gabriel Gavin, Gavin Federica di Sario, Victor Jack, "EU wants Azerbaijan to fuel Russian gas pipeline in Ukraine," Politico, 13 June 2024. See https://www.politico.eu/article/eu-asks-azerbaijan-replace-russian-gas-transit-deal-ukraine-expiring/

8) Ilya Roubanis, "Achim Wambach: Energia, Il Problema Tedesco, Gli Stati Generali," 20 December 2023. See https://www.glistatigenerali.com/energia-economia-reale_geopolitica/achim-wambach-energia-il-problema-tedesco/

9) IAE Energy Profile, "Azerbaijan". See https://www.iea.org/reports/azerbaijan-energy-profile/overview

10) Blaine Friedlander, "Liquefied natural gas footprint is worse than coal," 3 October 2024. This is the reality.

with renewable electricity, thereby releasing natural gas supply for exports in the short run. This energy substitution generates the revenue requires to further invest in renewables, paving the way from energy diversification to decarbonization.[11] In this scheme, the global system appears to be working in that it scopes the direction of regional investment by reducing available capital for upstream investment in fossil fuels, even as demand is pressing.[12]

Even before the Russian invasion of Ukraine, Georgia's place on the South Caucasus map was a key transit hub, a conduit for energy, transport, and trade.[13] Georgia has been a gateway to the European Single Market for landlocked states, not only due to geography, but also because Armenia has been for decades in a continuous state of war with Azerbaijan and its borders with Türkiye are sealed. Georgia, therefore, has a regional fossil fuel transit monopoly on Türkiye and Southeast Europe, as well as Russia and Armenia.[14] The same conditions frame the transborder electricity distribution network. Georgia lies at the epicenter of the Black Sea Transmission Network (BSTN), bridging regional producers to Türkiye and, further afield, the Single Market.[15] The country's Association Agreement with the EU means that Georgia is also significant for investment in electricity generation. Tbilisi has assimilated regulatory standards governing public-private partnerships, environmental sustainability, public engagement, accountability, and oversight.[16]

Azerbaijan, Georgia, and Türkiye's longstanding partnership have set significant regionalization precedents. Türkiye has a prevalent role in the energy map of the South Caucasus[17] both as a market and an investor. The 17th biggest economy in the

See https://news.cornell.edu/stories/2024/10/liquefied-natural-gas-carbon-footprint-worse-coal

11) John Roberts and Julian Bowden, "Caspian contributions to energy security in Europe," Atlantic Council Global Energy Centre: Issue Brief, July 2024. See https://www.atlanticcouncil.org/wp-content/uploads/2024/07/Caspian-contributions-to-energy-security-in-Europe.pdf

12) Ilya Roubanis, "Why the oil-producing Azerbaijan needs renewables: an interview with John Roberts," Caucasus Watch. 4 March 2024. See https://caucasuswatch.de/en/interviews/why-the-oil-producing-azerbaijan-needs-renewables-an-interview-with-john-roberts.html

13) Zaal Anjaparidze, "The Second Karabakh War and Georgia's Threatened Transit Role," Eurasia Daily Monitor (Jamestown Foundation), 16 February 2021. See https://jamestown.org/program/the-second-karabakh-war-and-georgias-threatened-transit-role/; Irakli Danelia, "Prospects of Development of Georgia's Transit Function and Its Impact on the Country's Economy," *Globalisation and Business*, Vol 4., No. 7, 2019. https://eugb.ge/index.php/111/article/view/187

14) "Georgia Country Profile," IEA, https://www.iea.org/reports/georgia-energy-profile/energy-security; "Transit role of Georgia in energy has been strengthened – Economy Minister," Business Media, 4 April 2024. See https://bm.ge/en/news/transit-role-of-georgia-in-energy-has-been-strengthened-economy-minister; Tamar Tsurtsumia, "Electricity Cooperation Opportunities in the South Caucasus: The Role of Georgia," Energy Charter Secretariat (Knowledge Centre). https://www.energycharter.org/fileadmin/DocumentsMedia/Occasional/Electricity_in_South_Caucasus.pdf; Murman Margvelashvili, "Georgia and its role in energy transit towards the West," WEG, December 2011. See https://weg.ge/sites/default/files/georgia-and-its-role-in-energy-transit-towards-the-west-final.pdf

15) Black Sea Transmission Network Project (BSTN), https://www.gse.com.ge/M9Ltvi2EQCCNYg7LvHW0JQ.html

16) "Energy system Transformation: Georgia," IEA, https://www.iea.org/reports/georgia-energy-profile/energy-system-transformation

17) World Bank, "Turkiye Country Profile,"

world has an ever-broadening industrial base and the profile of an emerging economy ready for a 'demographic dividend.'[18] Türkiye needs energy. In the post-Soviet space of the 1990s, Turkish policy focused on turning the country into a fossil fuel estuary, streaming the flow of fossil fuel "tributaries" from the Caspian, Russia, and the Middle East. The knock-on effect for Türkiye has been an ultra-competitive domestic energy market, adding to the country's unique value proposition for advanced manufacturing, along with preferential market access, competitive labor costs, and surging purchasing power. To retain its competitive momentum, the Turkish economy needs to address the ailments of emerging economies, including a volatile exchange rate and sizable trade deficits. The dash for renewables is of existential significance.

Finally, Armenia is experiencing an energy market transition wrapped in a geopolitical transition. Given its closed borders with Türkiye and in a continuous state of war with Azerbaijan, the country could not engage in the regionalization of critical energy infrastructure during the 1990s and 2000s. For decades, the country has relied entirely on Russia, with oil and gas transiting via Georgia. Part of this singular reliance on Russia was reflected in the ownership of the national grid by a Russian company (Inter RAO) and, in time, the Russian-Armenian businessman Samvel Karapetyan. Investment in energy generation will require liberalization, reviewing the reliance on a privately held monopoly over the transmission network, which the government criticizes for its failure to modernize and threatens with nationalization.[19] Armenia's network seclusion has encouraged a strategy of self-reliance, which includes investment in renewables (hydroelectric, wind, solar) and nuclear power. The high baseline level of natural gas prices should have accelerated investment in renewables, to increase the resilience of Armenian energy security.[20] However, even as the country pioneered the first wind farms,[21] the country remains an investment laggard. Domestic production continues to rely on traditional and tested technologies, such as hydroelectric and nuclear energy, which in 2021 accounted for 28 percent and 25 percent of the energy mix respectively.[22] Regulatory barriers constrain plans to scale up investment – the single buyer model – the need for grid modernization and

https://www.worldbank.org/en/country/turkey/overview#:~:text=T%C3%BCrkiye%20is%20the%2017th,official%20development%20assistance%20(ODA)

18) Zuzanna Krzyzanowska, "Turkey: a looming demographic crisis," OSW, 8 July 2024. See https://www.osw.waw.pl/en/publikacje/osw-commentary/2024-08-07/turkey-a-looming-demographic-crisis#:~:text=The%20median%20age%20rose%20from,over%2065%20accounted%20for%2010.2%25

19) Arshaluys Barseghyan, "Armenian government attacks on electricity supply lead to natioanlisation rumours," OC Media, 10 October 2024. See https://oc-media.org/armenian-government-attacks-on-electricity-supply-lead-to-nationalisation-rumours/

20) "Armenia Least Cost Energy Development Plan (2020-2036): Market Liberalisation and Electricity Trade (MLET) Program," November 2019. See http://energinst.am/files/LCEDP%20Report_with%20Append_Eng_forSRIE.pdf

21) Armenian Calling: a new frontier for renewable energy," Haig and Barrett Partners, 2024. See https://www.haigbarrettpartners.com/podcasts-blog/armenia-calling-a-new-frontier-for-renewable-energy

22) "Nuclear Power in Armenia," World Nuclear Association, 10 May 2024. See https://world-nuclear.org/information-library/country-profiles/countries-a-f/armenia

geopolitical risk.[23] A key variable to the country's energy security is the question of its nuclear energy capacity.[24] Without the regionalization of its grid infrastructure, Armenia does not appear to have a viable pathway towards net-zero.

Seeking a Role in the South Caucasus

The South Caucasus shares the classic policy trilemma of maintaining energy security in the present, investing in renewables production for the medium-to-long term, and preventing the erosion of competitiveness. These are difficult priorities to square. Much depends on the concept of "grid parity," or the dropping of production costs for renewables to equal or lower price levels than fossil fuels to incentivize investment in renewables.[25] This objective has been achieved for key renewable technologies such as solar and wind in regions with well-developed grid infrastructure, notably in China, California, or Europe. Distribution is key because many of these technologies produce energy that is "intermittent" rather than dispatchable[26] or, in other words, energy that is not available on demand, where it is needed, seven days a week. This challenge can be addressed by scaling up storage capacity or investing in smart grids that balance demand and supply across broader geographical areas.[27] As we are nearing the COP29 in Baku, it is important to see how local geopolitical conditions combine with global regulatory regimes to facilitate or disrupt energy transition.

Case Study 1. Türkiye's Geothermal Power

Türkiye is seeking a roadmap to evolve its competitive advantage in energy pricing. Despite surging electricity consumption, Türkiye has been able to build an energy mix with a 50 percent share of renewables. That is highly reliant on hydroelectricity production, a source that may become less reliable as European water resources are dwindling, precipitation is dropping, and evaporation is increasing. Solar and Wind are gaining ground and will continue at pace to set the tone in renewables investment as battery technology is scaling up. However, the question of securing reliable sources of baseload energy is urgent.

One direction Türkiye could look to for baseload energy is geothermal, a choice

23) IEA Country Profile. "Armenia." https://www.iea.org/reports/armenia-energy-profile/overview

24) IAEA, "Armenia: Nuclear Power Country Profile," See https://cnpp.iaea.org/public/countries/AM/profile/highlights

25) Robin Whitlock, "BNEF: solar and wind reach parity with power prices in California, China, and parts of Europe," Panorama, 29 October 2019. See https://www.renewableenergymagazine.com/panorama/bnef-solar-and-wind-reach-parity-with-20191029

26) Why 'Grid Parity' is a Meaningless Concept,' Institute for Energy Research. See https://www.instituteforenergyresearch.org/grid-parity-meaningless-concept/

27) Karl Mathiesen et al., "A new inconvenience truth: Europe's global plans all require money no one has," Politico, 17 April 2024. See https://www.politico.eu/article/europe-global-plans-money-green-economy/

that is anything but obvious in comparative perspective. With 63 geothermal plants, this sector barely covers 3-4 percent of Türkiye's total electricity generation (1,7 GW: 2023, 3GW est. 2030 installed capacity). In the words of the energy investment advisor, Ardic Akcin,[28] "this is the most viable path to renewable baseload energy; it may not replace natural gas, but it could go a long way to reduce energy imports." Indeed, the contribution of geothermal in Türkiye's energy mix should be set in context. For a country like Türkiye, the small contribution of geothermal energy to the overall energy mix is quite significant and corresponds to 11TW, or 5bcm of imported natural gas. While it is true that the use of closed loop systems to generate electricity from deep geothermal plants is rare in Europe, Türkiye has unmatched potential. According to the Head of Policy of the European Geothermal Energy Council, Sanjeer Kumar, "Türkiye should be a global leader (…) but to move forward geological potential needs to be matched by industrial vision." West Anatolian geology means that Türkiye has explored less than 10 percent of its proven capacity. However, to explore its capability at scale, "they should be producing their pumping technology," Kumar argues.

Once developed, geothermal units can provide returns for a century rather than a maximum of 12-years that solar panel fields. Unlike solar panels, which are baseload energy, dispatchable on demand, and more resilient to climate change than hydroelectric power generation. European standards still matter, as Türkiye must mitigate the challenge of sulfur emissions to retain geothermic energy within the green energy taxonomy's scope and ensure the energy source's social sustainability. From an investors' perspective, policy planning is challenging. Drilling and exploration are capital-intensive processes that requires a commitment of eight to ten years. De-risking is necessary. While Türkiye's Renewable Energy Resources Support Mechanism (YEKDEM) did provide a guaranteed feed-in tariff from 2005 to 2020 close to the 12 Cents/KW that international financial institutions consider viable, the country's currency crisis took its toll on the overall investment climate. In December 2020 the government de-dollarized guaranteed feed-in electricity tariffs, exposing the sector to the friction between hard-currency-denominated liabilities and Turkish lira-denominated revenue. According to Ufuk Şentürk, the chair of the National Geothermal Power Plant Investors' Association, the de-risking strategy is back on track. Since May 2023, the dollar denomination of feed-in tariffs was restored. In addition, the government the Development and Investment Bank of Türkiye (TKYB) is backing a drilling fund, with the state sharing both in the risk and the premium of deep geothermal exploration.

28) See https://ardicakcin.com/

Case Study 2. Georgia's Hydropower & Transit Potential

Türkiye has historically been one of the biggest investors in Georgia's hydroelectric energy generation. The country's 300 rivers provide a reliable baseload electricity source, which can rely on tested technology to generate cost-effective dispatchable energy for decades. Hydropower is the world's leading renewable energy source, and Georgia is well-positioned to become a regional superpower. In the words of Mathew Bryza, "Georgia's hydroelectric potential is second only to Norway's in Europe." The country's 300 rivers currently power is estimated to hold the production capacity of 50TW. Over 85 percent of the country's electricity generation is hydro generated although only 22,5 percent of the estimated potential is exploited.[29] The disruption of hydro-ecosystems for energy production is controversial[30] on several fronts, including issues with the flow of migratory fish and silt necessary to replenish agricultural soil, not to mention the flooding of local settlements. Georgia has sustained its own shared of controversy.[31] From an investors' perspective, as in the case of geothermal, once developed, the development of hydroelectric energy requires a long-term commitment, upfront capital investment, and a tumultuous process of stakeholders' management.[32] Timeline and cost overruns are the rule rather than the exception. With each passing year, however, Georgia acquires the capacity for electricity exports on scale.

Starting from a low threshold of hydroelectric capacity exploration means that additional capacity adds to the attraction of Georgia both as a manufacturing investment destination and to the overall capacity to export cost-effective "dispatchable" electricity. This capacity is only theoretical unless a grid is available that can sustain and carry this electricity to market. From an investors' perspective, the Executive Director of the EU-Georgia Business Council Giorgi Kacharava, suggests that the national grid's capacity and resilience have been bolstered, with projects such as the Jvari-Khorga Interconnection. Both business representatives and the member of the board of directors of Georgia's electricity transmission grid company (JSC Georgian State Electrosystem), Dr Zviad Gachechiladze, point to political resolve reflected

29) "Georgia country profile," IEA. https://www.iea.org/reports/georgia-energy-profile/energy-security

30) Jeff Operman, "Contradictions within Global Goals for Hydropower and Sustainable Energy," Forbes, 14 December 2023. See https://www.forbes.com/sites/jeffopperman/2023/12/14/contradictions-within-global-goals-for-hydropower-and-sustainable-energy/?sh=1a8753c13086; Jeff Operman, "Reducing Hydropower Investment Risk Depends on Minimizing Social and Environmental Risks," Forbes, 27 March 2024. See https://www.forbes.com/sites/jeffopperman/2023/12/14/investment-risk-for-hydropower-depends-on-minimizing-social-and-environmental-risks/#:~:text=A%20study%20by%20EY%20found,average%20overrun%20of%2060%20percent

31) "Hydropower development in Georgia," Bankwatch Network. See https://bankwatch.org/project/hydropower-development-georgia#project-publications; Judith Plummer-Braeckman, Sanna Markkanen, "Perceptions of risk in relation to large hydropower projects: a finance perspective," University of Cambredge Institute for Sustainability Leadership. See https://www.cisl.cam.ac.uk/system/files/documents/future-dams-working-paper-risk-2.pdf

32) "Challenges for hydropower-based National Determined Contributions," UCL Discovery. See https://discovery.ucl.ac.uk/id/eprint/10081761/1/Carvajal%20and%20Li%202019%20-%20Challenges%20for%20hydropower-based%20nationally%20determined%20contributions.pdf

in the government's 10-year Network Development Plan of Georgia (2023-2033). For Georgia, the objective is to both attract investment in Georgia and to evolve and maintain its nation-branding as a regional transit hub. This vision is articulated in the Black Sea Submarine Cable project (BSCC), linking the region via a subsea cable to Romania.

In July 2024 the Italian consultancy CESI presented the initial conclusion of the Feasibility Study on the 1100 km BSCC cable designed to enable energy exports to Romania and, thereon, Central and Southeast Europe. The study funded by the World Bank determined the economic viability of the BSCC, while there is a parallel technical study (ESPIRE) – seabed survey to determine the optimal subsea route.[33] While the capacity of the cable does not exceed 1,3 GW capacity, or enough to electrify a city of slightly over a million people. However, the project is ground-breaking in that it opens a second market for the South Caucasus electricity market. The national grid companies of Georgia, Romania, Azerbaijan, and Hungary back the project.[34] The four states refer to the Agreement on Strategic Partnership in the Development and Transmission of Green Energy signed in 2022 "the Green Energy Corridor" and are in fact building a brand, apart from the green electricity production and transmission, that may in the future include the production and transit of Green Hydrogen. The BSCC has the stated support of the European Commission[35] and the four states support an application for the designation of the project as a "mutual interest" project (PMI), which given is the support of Romania and Hungary is likely to be granted. That is likely to accelerate the projects access to direct grants, soft financing, and accelerated permitting.[36]

Starting from a low threshold of hydroelectric capacity exploration means that additional capacity adds to the attraction of Georgia both as a manufacturing investment destination and to the overall capacity to export cost-effective "dispatchable" electricity. This capacity is only theoretical unless a grid is available that can sustain and carry this electricity to market. From an investors' perspective, the Executive Director of the EU-Georgia Business Council Giorgi Kacharava, suggests that the national grid's capacity and resilience have been bolstered, with projects such as the Jvari-Khorga Interconnection. Both business representatives and the member of

33) "World Bank Approves 35$ Million Investment for Black Sea Submarine Cable Project Preparatory Activities," World Bank, 21 May 2024. See https://www.worldbank.org/en/news/press-release/2024/05/21/world-bank-approves-35-million-investment-for-black-sea-submarine-cable-project-preparatory-activities

34) Regional Growth: CESI Reveals Black Sea Cable Plan, CESI, 1 August 2024. See https://www.cesi.it/news/2024/regional-growth-cesi-reveals-black-sea-cable-plan/

35) "Statement by the President von der Leyen at the signing ceremony of the Memorandum of Understanding for the Development of the Black Sea Energy Submarine cable," 17 December 2022. See https://ec.europa.eu/commission/presscorner/detail/en/statement_22_7807

36) Nazrin Abdul, "Advancing as green energy exporter: Black Sea Cable enhances regional energy security," Azernews, 5 September 2024. See https://www.azernews.az/analysis/230805.html#:~:text=The%20agreement%20outlines%20the%20construction,a%20capacity%20of%201%2C000%20megawatts

the board of directors of Georgia's electricity grid (JSC Electrosystem), Dr Zviad Gachechiladze, point to political resolve reflected in the government's 10-year Network Development Plan of Georgia (2023-2033). For Georgia, the objective is to both attract investment in Georgia and to evolve and maintain its nation-branding as a regional transit hub. This vision is articulated in the Black Sea Submarine Cable project (BSCC), linking the region via a subsea cable to Romania.

Case Study 3: Azerbaijan's Intermittent Power

There is little doubt that should grid infrastructure and greenfield investment in proceed hand-in-hand, the South Caucasus can play an important role in sustainable electricity generation. The role of Azerbaijan in this respect is still not clear. According to the World Bank, Azerbaijan has wind generation capacity of around 157 GW, equivalent to more than 20 times its current installed electricity capacity.[37] This could allow Azerbaijan to evolve its position from a fossil fuels middle power to a renewables' powerhouse. In 2022 Baku unveiled a roadmap for the installation of 7GW offshore Wind Capacity by 2040, meeting 37 percent of its domestic energy needs.[38] Currently, Azerbaijan's renewables makeup approximately 20 percent of the country's energy mix, spearheaded by hydropower.[39] The pace of this projected development suggests a cautious approach to energy transition, as a range of regulatory and infrastructural bottlenecks have to be addressed.

The offshore wind sector passed the 1TW global installed capacity threshold in 2023 and is heading towards 2TW by 2030, lugging far behind hydroelectric production. The country's renewable capacity requires investment in infrastructure comparable to the dush for the pipelines that placed the country on the fossil fuel map in the 1990s and early 2000s. Theoretically, investment in "upstream" production, the national grid and transborder interconnectors should enable the evolution of Azerbaijan's role in energy value chains. Dr Gachechiladze already points towards the possibility of the BSCC "congestion" pointing out that feasibility studies are underway for the scaling up subsea interconnectors to facilitate 4-to-6 GW to the EU. However, this transition does not have a precedent, economic, technical, or in terms of governance. At present, Baku sees in offshore Wind as a possible key to retaining a significant place on the future energy map. The objective is to triple the country energy capacity

37) GWEC, "Global Wind Report 2024"3. See https://gwec.net/wp-content/uploads/2024/04/GWR-2024_digital-version_final-1.pdf

38) "New Roadmap to help Unllock 7GW of Offshore Wind Potential in Azerbaijan by 2040," World Bank Group, 3 June 2022. See https://www.worldbank.org/en/news/press-release/2022/06/03/new-roadmap-to-help-unlock-7gw-of-offshore-wind-potential-in-azerbaijan-by-2040

39) "The Use of Renewables Energy Resources in Azerbaijan," The Ministry of Energy of the Republic of Azerbaijan, 6 March 2024. See https://minenergy.gov.az/en/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade

by 2030, in a race in which most countries need to race just to stand still. This will require creating a complete value chain, including the manufacturing capacity to produce wind components, advancing maritime spatial planning, and permitting regulation.[40]

Case Study 4: Armenia's Path Towards Self-Reliance

Azerbaijan's stage-by-stage approach from the domestic substitution of fossil fuels to a renewable sector with export aspirations relies on some of the partners that paved its fossil fuel position in the energy market. BP is investing in solar power in Karabakh to electrify the operations of the Caspian Sea Sangachal oil terminal. Sangachal is Azerbaijan's largest onshore hub, where offshore oil and gas is processed prior to export.[41] The investment also has symbolic significance, as "Project Sunrise" (Shafag) was the first major foreign direct investment in the territory following the war with Armenia in 2020.[42] Nonetheless, Armenia and Azerbaijan have yet to sign peace and delimitation agreements, which coextensively means that Armenia cannot leave behind its networks' relative isolation. The country's grid is asynchronous to Georgia's and cross-border trade is limited. Aged interconnectors with Türkiye and Azerbaijan remain idle and unused.[43]

While the national grid is gradually modernized with the support of the World Bank and Germany's KfW, the country's grid is bundled with electricity generation, operates under the single-buyer model, and is unable to attract foreign direct investment in renewables. The thrust of Armenia's self-reliance energy policy depends on thermal plants, whereas nuclear energy capacity is exported to Iran and bartered for natural gas supplies. Armenian nuclear energy is an entirely state-owned sector (ANPP) representing 37 percent of domestic installed generation capacity. The EU has encouraged the country to accelerate its investment in renewables, with some progress achieved in solar energy. However, major investment projects have failed to materialise and those implemented have more domestic rather than regional significance.[44]

The most geopolitically significant development in Armenia's decarbonization

40) "Wind Europe and Azerbaijan join forces to accelerate wind energy," 4 March 2024. See https://windeurope.org/newsroom/press-releases/windeurope-and-azerbaijan-join-forces-to-accelerate-wind-energy/

41) Vladimir Afanasiev, "BP signs green power deal in move to electrify Caspian oil and gas terminal," Upstream, 3 October 2024. See https://www.upstreamonline.com/energy-transition/bp-signs-green-power-deal-in-move-to-electrify-caspian-oil-and-gas-terminal/2-1-1719007

42) "Azerbaijan says it is discussing solar energy production in Karabakh with BP," Reuters, 21 May 2021. See https://www.reuters.com/world/middle-east/azerbaijan-bp-discussing-solar-energy-production-karabakh-azeri-president-2021-05-21/

43) Armenia Country Profile: IEA. See https://www.iea.org/reports/armenia-energy-profile/energy-security-2

44) Hovhannes Nazaretyan, "Renewable Energy: Armenia's Opportunities and Limits," EVN Report, 20 April 2023. See https://evnreport.com/raw-unfiltered/renewable-energy-armenias-opportunities-and-limits/

agenda is negotiation with the United States to transition from reliance on Russia for nuclear fuel and technology.[45] There are also discussions on the adoption of small modular reactor (SMR) technology that should allow Armenia to maintain and perhaps expand the role of nuclear in its energy mix. This would be a move of major geopolitical significance, as the U.S. 1946 Atomic Energy Act sets limits to the export of nuclear technology abroad.[46] Furthermore, it would add to a policy of multi-alignment, stepping away from a singular dependence on Russia. Overall, Armenia will likely continue investing in nuclear energy as a path towards decarbonization, a pathway that echoes other landlocked countries, like Slovakia. However, beyond the geopolitical significance of the question at hand,[47] Armenia's does not seem to aspire towards a regionally significant role.

Concluding Remarks

First. Caucasus states negotiate their energy transition in a global governance framework, which puts manufacturing and energy value chains on a carbon tax notice. The "polluter pays" principle could erode Türkiye's impressive expansion of its industrial base, in a crisis that would echo the current German industrial crisis. It could threaten the role of Azerbaijan as Europe's energy partner, Georgia's role as a transit hub. Armenia could lose a second opportunity for regional integration. To avoid these predicaments, national strategies seek to capitalise on available competitive advantages. Ankara is taking long-term calculated risks, to retain the competitively priced and dispatchable baseload energy that a manufacturing power requires. Likewise, Azerbaijan's position on the energy map is challenged by liquidity limitations in the market for fossil fuel investment and the exhaustion of upstream potential. Looking forward, Baku needs to evolve its role. Starting from domestic fossil fuel substitution to maintain current levels of fossil-fuels exports, Azerbaijan tries to use its window of opportunity to evolve its current role as an exporter in the energy value chain. Georgia is trying to maintain its important transit hub role and enter more dynamically in production. Armenia is trying to evolve its self-reliance policy continues to prioritize security with a multi-alignment perspective.

Second. The building of new energy value chains requires risk and, therefore, well-planned de-risking strategies. Overall, the renewables energy market is more multidimensional, in that there is no single energy value chain that one can perfect

45) "Armenia seeks to join nuclear cooperation agreement with the United States," Armen Press, August 22, 2024, https://armenpress.am/en/article/1198120

46) Armenia's nuclear dilemma, Osservatorio ballcani e caucaso, February 9, 2024, https://www.balcanicaucaso.org/eng/Areas/Armenia/Armenia-s-nuclear-dilemma-233054

47) Kacper Szulecki and Indra Overland, "Russian nuclear energy diplomacy and its implications for energy security in the context of the war in Ukraine," Nature Energy, 27 February 2023. https://www.nature.com/articles/s41560-023-01228-5

over decades. Geothermal, hydro, wind, and solar need to work together, if the overall objective of net zero is to work at all. Entering many markets at the same time is more demanding in terms of national planning and calls engagement of a broader range of stakeholders. Türkiye is trying to overcome a prolonged to currency crisis and rebuild confidence in its foreign investment environment, which is crucial to making the most out of local natural resources. Energy planning remains foundational to industrial policy, requiring for instance the capacity to manufacture key pumping components that will allow Türkiye to lead in geothermy while also reducing currency risks. Azerbaijan will likewise need to develop wind farming manufacturing components, probably relying on the evolution of its shipyards. Georgia will have to maintain foreign direct investment from Europe and Türkiye, balancing foreign policy priorities against a volatile political agenda. Finally, Armenia is trying to balance between energy as a security factor and as a factor of production. Creating a market that can be receptive to foreign direct investment may be the only way to mobilize the kind of capital the country requires to meet the decarbonization time-bomb.

Third. Politics can stand on the way of regional transition. Elections, conflict, currency fluctuation and sovereign debt crises can derail major projects. This volatility becomes less tolerable in a period that requires greenfield investment, wrapped in a period of political transition, and geopolitical multipolarity. The challenge at hand with renewables is the demand for long-term investment in projects that compete for returns-on-equity with seemingly more safe choice. That calls kind of risk requires higher yields. While the cost of failure maintains regulatory momentum on a national level, too many failures on a national level could trigger a crisis of confidence in the ability of global governance to produce the desired effect. The internationalization of carbon emissions costs by polluters only works if key stakeholders in the industry are convinced that there is no alternative. Capital markets, regulators, social stakeholders, and diplomats must focus minds, which is why the COP exercise remains invaluable. That is a test to the resilience of governance as such, not merely industrial policy. Global technology competition, say between Russian and American nuclear power, is not solely determined by value propositions, but in a broader balance of power.

List of Interviewees

Ardic Akcin, Independent Energy Investment Advisor.

Mathew Bryza, Senior Fellow, Atlantic Council's Global Energy Centre.

Zviad Gachechiladze, Board of Directors, JSC Georgian State Electrosystem.

Giorgi Kacharava, Executive Director, EU-Georgia Business Council (EUGBC).

Arvea Marieni, Belgian and Italian Climate Pact Ambassador.

Sanjeer Kumar, Head of Policy at European Geothermal Energy Council.

John Roberts, Senior Fellow, Atlantic Council Global Energy Centre.

Ufuk Senturk, Geothermal Power Plant Investors Association (JESDER).

Research Article

ENERGY TRANSFORMATION IN THE EUROPEAN UNION: THE SHIFT TOWARDS RENEWABLE SOURCES AND GEOPOLITICAL CHALLENGES

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This article examines the transatlantic region's energy transformation, focusing on the European Union's shift towards renewable energy sources amidst geopolitical instability. It explores how recent geopolitical disruptions, particularly the Russia-Ukraine conflict, have accelerated Europe's transition to renewables to enhance energy security and reduce dependence on fossil fuels. The rise of renewable energy, challenges associated with intermittency, the resurgence of nuclear power, and the Scandinavian and Baltic countries' leadership in heating and cooling innovations are discussed. The paper highlights opportunities for achieving energy security through sustainable energy solutions while addressing policy and technological challenges.

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Keywords: Green Energy, Renewable Sources, Transformation, Energy Security, Geopolitical Instability.

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The global energy landscape has witnessed profound and transformative changes over the last few decades, driven by a combination of factors including rapid technological advancements, shifting patterns of energy demand, and significant geopolitical events that have disrupted traditional energy supply chains. These disruptions have been particularly acute in the transatlantic region, comprising Europe and North America, which has historically been dependent on fossil fuel imports from geopolitically volatile areas. As the world's energy supply has increasingly been used as a political tool, the transatlantic region's reliance on external sources for oil and gas has exposed its vulnerabilities. The recent geopolitical environment, marked by conflicts, sanctions, and shifts in global power dynamics, has exacerbated these vulnerabilities, creating new challenges for energy security.

In response to these challenges, many transatlantic countries have accelerated their efforts to transition toward a more sustainable energy model that is less reliant on fossil fuels and more dependent on renewable energy sources. This energy transition is not just a necessity driven by environmental concerns such as climate change, but also a strategic imperative for enhancing energy security, reducing geopolitical risks, and fostering economic resilience. The intersection of energy security and sustainability has thus become a defining feature of contemporary energy policy in the transatlantic region. This article explores the key factors shaping the energy transition, analyzes the role of geopolitical instability, and discusses the challenges and opportunities for achieving energy security through adopting renewable energy sources.

Geopolitical Instability and the Impact It Has Over Energy Security

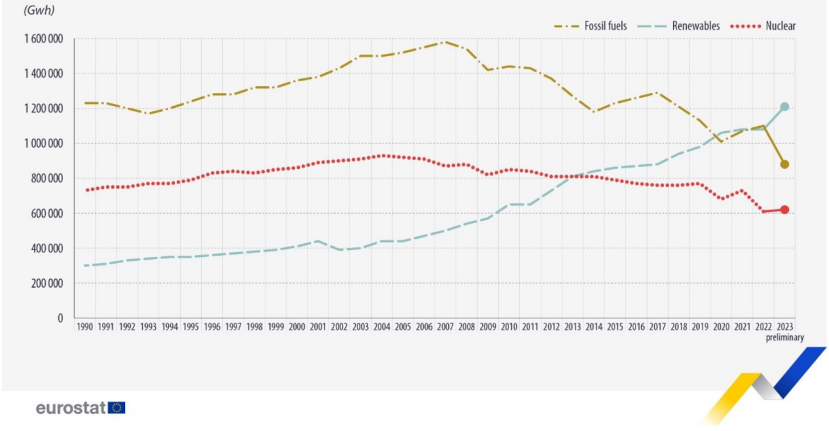
Over the past two decades, geopolitical instability has emerged as a significant factor influencing global energy markets, with profound implications for the transatlantic region. The energy supply chains upon which Europe and North America have traditionally relied have been disrupted by a range of geopolitical events, including conflicts, economic sanctions, and shifts in alliances. One of the most significant recent events affecting energy security in Europe has been the escalation of the conflict between Russia and Ukraine in 2022. Russia, a major supplier of natural gas and oil to Europe, faced sweeping sanctions from the European Union and the United States following its military actions in Ukraine. This led to a sharp reduction in energy supplies to Europe, triggering a full-scale energy crisis in the region. For decades, Europe had depended heavily on Russian energy imports, especially natural gas, which was viewed as a cleaner alternative to coal in the context of the region's transition toward a low-carbon economy. Russian gas had been a cornerstone of Europe's energy mix, accounting for around 40 percent of its total gas consumption

before the conflict. This dependency left Europe vulnerable when Russian gas supplies were curtailed due to the imposition of sanctions. In response, European countries were forced to diversify their energy sources quickly, turning to liquefied natural gas (LNG) imports from countries like the United States and Qatar, while also accelerating investments in renewable energy and reconsidering the role of nuclear energy in their energy mix. The geopolitical crisis in Ukraine thus exposed the fragility of Europe's energy security, highlighting the risks associated with an overreliance on a single supplier for critical energy resources. It also accelerated the drive toward renewable energy to reduce Europe's vulnerability to future energy supply disruptions. In this context, renewable energy sources, which are locally produced and do not require the same level of geopolitical risk management as fossil fuels, have gained increasing importance in the region's energy strategy. However, the transition to renewables presents its own challenges, particularly in ensuring that energy systems remain reliable and resilient as they shift away from traditional energy sources.

The Rise of Renewable Energy in Europe

Despite the challenges posed by geopolitical instability, Europe has made remarkable progress in its transition toward renewable energy. By 2023, the European Union achieved a historic milestone when, for the first time, electricity generation from renewable sources surpassed that from fossil fuels (see Chart 1).

Picture 1. Electricity production in the EU (1990-2023)[1]



1) Chart is sourced from Eurostat, See https://ec.europa.eu/eurostat/web/main/data/database

This achievement was the result of years of concerted efforts to promote renewable energy as part of the EU's broader climate and energy goals, which include reducing greenhouse gas emissions by at least 55 percent by 2030,[2] achieving a 42.5 percent share of energy from renewable sources by 2030,[3] and becoming climate-neutral by 2050. Several factors, including advances in renewable energy technologies, a supportive regulatory framework, and a strong political commitment to decarbonization have driven the European energy transition. The cost of renewable energy technologies, particularly solar and wind power, has declined significantly over the past two decades,[4] making them increasingly competitive with traditional fossil fuels. This cost reduction has been a key driver of the rapid expansion of renewable energy capacity across Europe. Nevertheless, despite major expansions in photovoltaic (PV) manufacturing in the United States and India, largely fueled by policy incentives, China is projected to retain its substantial 80-95 percent share of global supply chains across different manufacturing stages. In addition, the European Green Deal, adopted in 2019, set the political and regulatory foundation for an accelerated shift toward clean energy, with ambitious targets for deploying renewables, energy efficiency measures, and developing a green economy. Solar and wind power have emerged as the cornerstones of Europe's renewable energy strategy. Wind energy, in particular, has become a dominant source of electricity generation in several EU countries, including Germany, Spain, and Denmark. Offshore wind power has also gained traction, with countries like the United Kingdom and the Netherlands leading the way in developing large-scale offshore wind farms. Solar power has also seen significant growth, particularly in southern European countries such as Spain, Italy, and Greece, where favorable weather conditions make solar energy a highly viable option. However, the transition to renewable energy is not without its challenges. One of the key issues is the intermittent nature of renewable energy sources, such as wind and solar, which are dependent on weather conditions. This intermittency requires developing energy storage solutions, such as batteries and hydrogen, and grid modernization to ensure a reliable and stable energy supply. In addition, the expansion of renewable energy capacity has raised concerns about the environmental and social impacts of large-scale wind and solar farms, particularly in terms of land use, biodiversity, and local community opposition.

2) European Green Deal, See https://www.consilium.europa.eu/en/policies/green-deal/#:~:text=The%20package%20includes%20initiatives%20covering,it%20during%20its%20December%20meeting

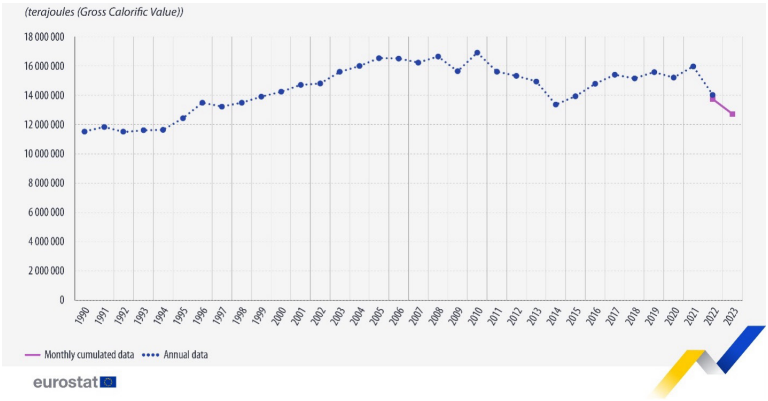
3) European Environment Agency, "Share of energy consumption from renewable sources in Europe". https://www.eea.europa.eu/en/analysis/indicators/share-of-energy-consumption-from?activeAccordion=

4) Our World in Data, Hannah Ritchie "Solar panel prices have fallen by around 20% every time global capacity doubled". https://ourworldindata.org/data-insights/solar-panel-prices-have-fallen-by-around-20-every-time-global-capacity-doubled

The Decline of Natural Gas in the European Energy Mix

The geopolitical tensions and the resulting cutback in Russian gas supplies have significantly diminished the role of natural gas in Europe's energy mix (see Chart 2). This shift became apparent quickly, as imports from Russia steadily declined, while gas supplies from Norway and the United States saw substantial growth between 2021 and 2023.[5] Natural gas, once seen as a "bridge fuel" that could help Europe transition away from coal and toward a low-carbon future, has increasingly been viewed as a liability due to its association with geopolitical risk. In the wake of the energy crisis, many European countries have sought to reduce their reliance on natural gas by turning to alternative energy sources, including renewables, nuclear power, and LNG imports from more stable regions.

Chart 2. Inland demand of natural gas in the EU (1990-2023)[6]

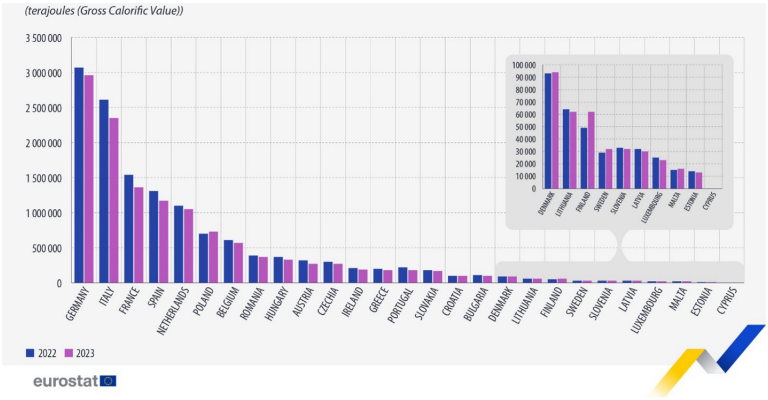


Between 2022 and 2023, natural gas demand in Europe declined sharply, with several EU countries reporting significant reductions in gas consumption (see Chart 3).

5) European Council, “How EU countries weathered a Russia-induced crisis and are reshaping energy supply”. https://www.consilium.europa.eu/en/energy-leap-how-eu-countries-russia-crisis-supply/

6) Chart is sourced from Eurostat, See https://ec.europa.eu/eurostat/web/main/data/database

Chart 3. Inland demand of natural gas, 2022 and 2023[7]



Germany, the largest consumer of natural gas in Europe, saw a dramatic decrease in gas imports from Russia, leading to a push for alternative energy sources. The German government accelerated plans to phase out coal and expand renewable energy capacity, while also revisiting the role of nuclear power in the country's energy strategy. Other European countries, including France, Italy, and Spain, also experienced declines in natural gas demand as they shifted toward renewables and diversified their energy imports. However, some countries, particularly in Eastern Europe, continue to rely on natural gas for a significant portion of their energy needs. Poland, for example, has increased its LNG imports from the United States and Qatar to offset the loss of Russian gas,[8] while also pursuing investments in renewable energy and nuclear power. The decline of natural gas in Europe marks a significant turning point in the region's energy transition. While natural gas had been a critical component of Europe's energy system for decades, its future role is increasingly uncertain in light of geopolitical instability, climate policy, and the growing competitiveness of renewable energy. The challenge for European policymakers is to manage this transition in a way that ensures energy security, affordability, and sustainability.

The Role of Nuclear Energy in Ensuring Energy Security

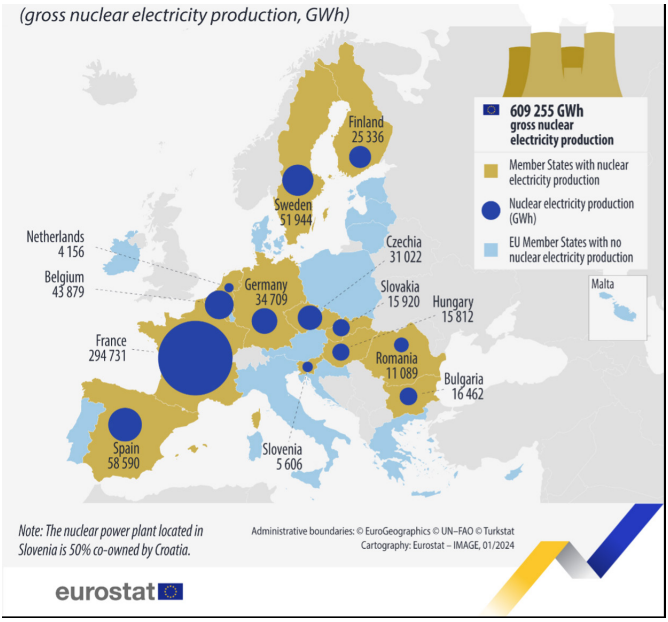
As Europe grapples with the challenges of energy security and the energy transition, nuclear power has reemerged as a key component of the region's energy strategy. Nuclear energy offers several advantages in the context of the energy transition: it is a low-carbon source of electricity, it provides a stable and reliable supply of baseload power, and it can help reduce dependence on imported fossil fuels. However, nuclear

7) Chart is sourced from Eurostat, See https://ec.europa.eu/eurostat/web/main/data/database

8) ACER, European Union Agency for the Cooperation of Energy Regulators, "Analysis of the European LNG Market Developments 2024 Market Monitoring Report". https://www.acer.europa.eu/sites/default/files/documents/Publications/ACER_2024_MMR_European_LNG_market_developments.pdf

energy also faces significant challenges, including concerns about safety, waste management, and the high upfront costs of building new nuclear power plants. France has long been a leader in nuclear energy, with around 70 percent of its electricity generated from nuclear power (See Picture 1).

Picture 1. Nuclear energy in the EU, 2022[9]



In response to the energy crisis, the French government has reaffirmed its commitment to nuclear energy, announcing plans to build new reactors and extend the life of existing ones. Other European countries, including the United Kingdom, Finland, and Poland, have also signaled their intention to invest in nuclear energy as part of their long-term energy security strategies. However, the role of nuclear energy in Europe remains a contentious issue. Germany, for example, has pursued a policy of phasing out nuclear power following the Fukushima disaster in 2011, and the last of its nuclear plants is set to close by 2023. Despite the energy crisis, Germany has remained committed to its nuclear phase-out, focusing instead on expanding renewable energy and LNG imports. The debate over nuclear energy in Germany reflects broader concerns about nuclear power's safety and environmental impact, as well as the political and social opposition to nuclear energy in some parts of Europe. The future of nuclear energy in Europe will depend on a range of factors, including public opinion, regulatory frameworks, and the availability of financing for new projects. While nuclear power is likely to play a role in ensuring energy security in

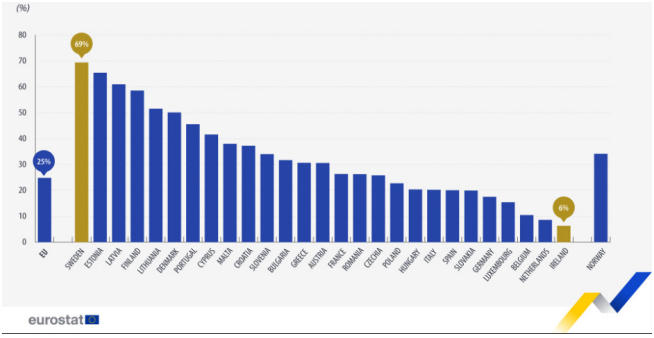
9) Chart is sourced from Eurostat, See https://ec.europa.eu/eurostat/web/main/data/database

the short to medium term, its long-term viability will depend on the development of next-generation nuclear technologies, such as small modular reactors (SMRs), which promise to be safer, more flexible, and more cost-effective than traditional nuclear reactors.

The Scandinavian and Baltic Model: A Blueprint for Energy Transition

The Scandinavian and Baltic countries have emerged as leaders in the transition to renewable energy, particularly in the area of heating and cooling (see Chart 4). These countries have adopted innovative technologies, such as district heating systems, geothermal energy, and heat pumps, to reduce their reliance on fossil fuels for heating and cooling. Environmental concerns, energy security considerations, and technological innovation have driven this transition.

Chart 4. Share of energy from renewable sources for heating and cooling, 2022[10]



Sweden, Finland, and Denmark, in particular, have made significant progress in integrating renewable energy into their heating and cooling systems. District heating, which uses waste heat from power plants and industrial processes to heat buildings, has become a common feature of urban energy systems in these countries. Geothermal energy, which harnesses heat from beneath the Earth's surface, is also widely used for heating in Iceland and parts of Finland. Heat pumps transfer heat from the air or ground into buildings and have become a key technology in the region's heating and cooling systems. Heat pumps are highly energy-efficient and can be powered by renewable electricity, making them a sustainable alternative to traditional fossil fuel-based heating systems. The widespread adoption of heat pumps in Scandinavia and the Baltic states has helped reduce the region's carbon footprint and enhance its energy resilience. The success of the Scandinavian and Baltic countries in transforming their energy systems offers important lessons for other regions seeking

10) Chart is sourced from Eurostat, See https://ec.europa.eu/eurostat/web/main/data/database

to reduce their reliance on fossil fuels. Their experience demonstrates the importance of government support for renewable energy, the need for public acceptance of green technologies, and the value of investing in energy-efficient solutions. As Europe and North America continue their energy transition, the Scandinavian and Baltic model provides a blueprint for achieving a sustainable and secure energy future.

Concluding Remarks

In summary, the energy transition within the European Union and the broader transatlantic region has reached a pivotal moment, driven by a convergence of geopolitical challenges and an increasing demand for sustainable energy solutions. The disruption of traditional energy supply chains, particularly in Europe, has accelerated the transition toward renewable energy and highlighted the critical need for diversification to ensure long-term energy stability. The growing reliance on renewable energy and a renewed focus on nuclear power offers a clear pathway for diminishing dependence on fossil fuels and enhancing energy resilience. While challenges such as the intermittency of renewable sources, the high costs associated with nuclear energy, and the necessity for advancements in energy storage and grid modernization persist, these obstacles also create new opportunities. The urgent need to address energy security has spurred the expansion of renewable energy production and increased the proportion of green energy within the energy mix. As policymakers navigate the intricate geopolitical landscape, they must strike a balance between ensuring energy security and the pressing obligation to reduce greenhouse gas emissions and combat climate change. The achievements of countries like Sweden, Finland, and Denmark in successfully integrating renewable energy provide valuable lessons for the transatlantic region. By persistently investing in clean energy technologies, enhancing energy efficiency, and implementing comprehensive policy frameworks, the region can secure a sustainable and resilient energy future that meets the needs of both current and future generations.

Research Article

ENERGY SECURITY AND GREEN TRANSFORMATION AMID GEOPOLITICAL CONFLICTS

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Amidst the pressing global energy transition, nations strive to shift from fossil fuels to renewables, grappling with environmental urgency and complex energy security challenges. This article explores the multifaceted impact of geopolitical tensions, including the Russia-Ukraine conflict and Middle Eastern instability, on energy security and the global green transformation. It discusses how these conflicts have triggered both short-term reliance on fossil fuels and a renewed drive toward sustainable energy independence. Moreover, it delves into Europe's Green Deal, China's technological advancements, and the United States return to the Paris Agreement as transformative steps, all underscoring the need for robust international cooperation. This in-depth analysis highlights the strategies, obstacles, and global collaborations essential for achieving a resilient and sustainable energy future.

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Keywords: Energy Security, Green Transformation,
Geopolitical Tensions, Energy Independence, Sustainable Energy.

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The world is undergoing a transformative shift in its energy systems. Although fossil fuels have constituted the backbone of global economies since the mid-20th century, this framework has become unsustainable. The environmental costs and supply security risks of fossil-based energy systems have compelled countries to transition to renewable energy sources. However, this shift entails a series of challenges for energy security. Conflicts, notably the Russia-Ukraine war and instability in the Middle East, have heightened threats to energy supply security, underscoring the significance of renewable energy investments.

Energy security is critical not only for strategic interests but also for the sustainable well-being of societies. Ensuring uninterrupted access to energy is vital for safeguarding living standards, maintaining economic stability, and promoting sustainable development. However, dependency on fossil fuels complicates this security imperative. Rising energy costs and supply chain disruptions may hinder the green transition, yet the unsustainable nature of fossil-based energy infrastructure has become one of the main drivers incentivizing investments in renewable energy sources.

The Transformative Impact of Geopolitical Conflicts on Energy Security

Historically, energy security has been defined by a nation's capacity to ensure an uninterrupted and cost-effective energy supply, with fossil fuel-based trade sitting at the heart of geopolitical relations. Energy security is integral to the green transition; countries must secure their energy supply sustainably while continuing economic development. Although the transition to renewable energy holds the long-term potential for energy independence, this process faces obstacles such as supply shortages and price fluctuations that can strain nations during the transition phase.

Energy security is crucial for economic growth, sustaining citizens' living standards, and ensuring sustainable development. However, fossil fuel-based systems create environmental issues, complicating the fight against climate change. Germany's Energiewende initiative exemplifies this; by phasing out nuclear and fossil fuel usage, Germany aims to transition to renewable energy. Yet this shift has led to temporary supply shortages and increased energy costs.[1]

The transition to renewable energy is an environmental necessity and an economic and strategic imperative. The European Union (EU) has taken significant steps in this regard, aiming to achieve carbon neutrality by 2050 by phasing out fossil

1) Clean Energy Wire, "Germany's Energiewende in brief,"
https://www.cleanenergywire.org/germanys-energiewende-brief accessed on 14 October 2024.

fuels.[2] However, sudden increases in energy prices and supply chain disruptions have compelled many countries to revert to fossil fuels in the short term.

Geopolitical conflicts that impact energy supply, particularly in regions dependent on energy imports such as Europe, pose direct threats to energy security and green transition processes. The Russia-Ukraine conflict, for instance, has led to sharp fluctuations in energy prices and placed European countries in serious energy supply predicaments. In 2022, Russia reduced its natural gas exports to the E U by 80 percent, causing gas prices to surge by up to 300 percent.[3] Consequently, the EU has decided to enhance its liquefied natural gas (LNG) imports and expedite renewable energy investments to reestablish energy security.[4]

These types of geopolitical conflicts not only threaten energy security but may also force countries to revert to fossil fuels temporarily. For instance, many European countries have had to reactivate coal plants temporarily but are simultaneously developing strategies to accelerate the transition to renewable energy.[5] The Russia-Ukraine war has compelled Europe to reassess its energy policies, leading to diversification and increased investment in sustainable energy sources.

Moreover, trade and technological competition between China and the United States significantly impacts energy security. China holds a substantial share in renewable energy technologies, leading globally in solar and wind energy production.[6] This growth in China's energy production capacity and its influence on the green transition have significant implications for shaping global energy markets.

With its central role in global oil production, the Middle East remains a critical element affecting energy markets worldwide. The strategic role of countries such as Saudi Arabia and the United Arab Emirates in energy supply means that regional instability often leads to sudden fluctuations in global oil prices. Tensions between Saudi Arabia and Iran in 2022 and ongoing conflicts in Yemen have resulted in uncertainties in oil supply, causing rapid increases in oil prices. Additionally, disputes over production quotas among OPEC+ countries have added complexity to strategies for controlling oil supply. Fluctuations in global oil prices directly threaten energy

2) European Commission, "2050 Long-term Strategy," Climate Action, https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2050-long-term-strategy_en accessed on 11 October 2024.

3) European Central Bank, "Speech by Fabio Panetta,Member of the Executive Board of the ECB," ECB, 16 November 2022, https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp221116~c1d5160785.en.html accessed on 17 October 2024.

4) GIS Reports Online, "The European Union's LNG supply security" https://www.gisreportsonline.com/r/eu-lng/ accessed on16 October 2024.

5) Clean Energy Wire, "German govt takes next step to reactivate hard coal plants for supply security in gas crisis," https://www.cleanenergywire.org/news/german-govt-takes-next-step-reactivate-hard-coal-plants-supply-security-gas-crisis accessed on 16 October 2024.

6) World Economic Forum, "China rapidly expands wind power capacity: Here's what you need to know about the global energy transition this week" https://www.weforum.org/agenda/2023/03/china-wind-power-energy-transition-power-global-energy-crisis-6-march/ accessed on 15 October 2024.

security, especially for nations dependent on energy imports. Despite the decline in demand at the onset of the COVID-19 pandemic in the early 2020s, oil prices surged rapidly due to geopolitical crises in the Middle East.[7] This increase has intensified economic pressures in regions such as Europe and Asia, pushing countries towards urgent renewable energy investments. These tensions in the Middle East serve as catalysts for accelerating energy transition processes worldwide, simultaneously making short-term fossil fuel dependency inevitable.

Geopolitical Crises as Catalysts for Green Transition

Geopolitical crises deepen concerns over energy security while also acting as significant catalysts for accelerating the transition to renewable energy. In regions dependent on fossil fuels, energy security policies have become more robust during periods of crisis, increasing the need for investment in renewable energy sources. Consequently, investments in renewable energy are now prioritized not only for environmental reasons but also for strategic and economic independence. Accelerating investments by governments and the private sector in this area have significantly contributed to the rapid proliferation of green energy technologies.

The Russia-Ukraine conflict has shaken confidence in fossil fuel dependency across Europe, hastening the transition to sustainable solutions for energy security. In this context of energy insecurity, countries' efforts to reduce fossil fuel dependency have become an essential factor driving the green transition. Germany, for example, aims to meet 80 percent of its electricity demand from renewable sources by 2030,[8] while Northern European countries are expediting their transition to green energy independence through substantial investments in hydropower and offshore wind energy.

China has also become a significant player in this transition. Under its 14th Five-Year Plan, China seeks to increase its renewable energy production, reduce energy imports, and sustain its global clean energy market leadership.[9] In 2021, China accounted for 70 percent of global solar panel production, a share that may reach 80 percent by 2025.[10] As of 2022, wind energy capacity in Europe also grew by 15

7) Middle East Institute, "COVID-19, the oil price war, and the remaking of the Middle East," https://www.mei.edu/publications/covid-19-oil-price-war-and-remaking-middle-east accessed on 15 October 2024.

8) Clean Energy Wire, "Germany's Aim for 80% Renewables in Electricity by 2030 Well Within Reach-Minister," https://www.cleanenergywire.org/news/germanys-aim-80-percent-renewables-electricity-2030-well-within-reach-minister accessed on 17 October 2024.

9) S&P Global Commodity Insights, "China's 14th Energy Five-Year Plan: Pivoting Toward a Modern Energy System," https://www.spglobal.com/commodityinsights/en/ci/research-analysis/chinas-14th-energy-fiveyear-plan-pivoting-toward-a-modern-ener.html accessed on 17 October 2024.

10) International Energy Agency, "Solar PV Global Supply Chains: Executive Summary," https://www.iea.org/reports/solar-pv-global-supply-chains/executive-summary accessed on 19 October 2024.

percent, underscoring the accelerated pace of the green transition.[11]

Investment and Technological Development Needs for Green Transition

For the energy transition to succeed, it requires the shift from fossil fuels to renewables and substantial investments in technology development and infrastructure. Energy storage systems, grid modernization, smart grids, and energy efficiency technologies are fundamental components of this transition. Transitioning from fossil fuels to renewable sources demands a thoroughly restructuring existing energy infrastructure.

The development of these technologies contributes to accelerating the green transition and lowering costs, making the shift more accessible. In 2021, global energy storage capacity grew by 30 percent, reaching 20 GW, while the cost of lithium-ion batteries has dropped by 90 percent since 2010.[12] These advancements have expanded the applicability of renewable energy sources and supported energy supply security. However, access to these technologies may be limited by geopolitical tensions, particularly the escalating trade disputes between the United States and China, which may slow down strategic green transition processes due to disagreements over trade and technology. Additionally, China's dominance in rare earth element production renders the green transition partially dependent on China.

The Role of International Cooperation in Sustainable Energy Policies

Securing energy and achieving green transition goals should not be confined to national efforts but should instead be achieved through coordinated international collaboration. In this regard, the Paris Agreement stands as a cornerstone of global cooperation, guiding countries with binding targets for carbon emissions reduction and accelerated renewable energy transition, while aiming to ensure global energy security.

The success of sustainable energy policies relies on collaboration, particularly among major economic powers. For instance, the EU's Green Deal serves as a prominent example for accelerating global energy transition. Through this deal, the EU aims to reduce its own carbon emissions and support green energy transition through partnerships with third countries. This initiative is backed by a comprehensive energy strategy, with the EU planning to invest €1 trillion and cut emissions by 55 percent

11) WindEurope, "Wind Energy in Europe 2022: Statistics and the Outlook for 2023-2027," https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2022-statistics-and-the-outlook-for-2023-2027/ accessed on 19 October 2024.

12) PV Magazine, "IEA Calls for Sixfold Expansion of Global Energy Storage Capacity," 26 April 2024. https://www.pv-magazine.com/2024/04/26/iea-calls-for-sixfold-expansion-of-global-energy-storage-capacity/ accessed on 24 October 2024.

by 2030.[13]

The EU's Green Deal is an environmental endeavor and a strategic policy aimed at countering China's growing influence in energy markets. Through this initiative, the EU seeks to enhance its leadership in green energy technology and reduce dependency on energy imports, establishing a new power center in the global energy markets. This move is particularly relevant in light of China's dominance in solar panel and wind turbine production, as the EU's efforts to bolster its green technology capacity are vital for environmental goals and global trade and energy security. Thus, the Green Deal aims to balance China's influence in the energy market while protecting the EU's economic interests.

The United States' withdrawal from the Paris Agreement under President Donald Trump's administration allowed China to lead in global climate policy. However, President Joe Biden's administration's reentry into the agreement can be considered part of a strategy to restore U.S. influence in this arena and counterbalance China's growing impact. By increasing investments in renewable energy technologies and green economy, the U.S. aims to achieve environmental goals while balancing China's dominance in technology and energy markets. In 2021, the U.S. increased its renewable energy investments by 40 percent over the previous year, reaching $110 billion.[14] However, trade wars between the U.S. and China and supply chain issues related to renewable energy technologies pose significant obstacles to this process, presenting risks that could slow green transition goals.

Global platforms that facilitate global cooperation, such as COP summits, are essential for coordinating sustainable energy policies worldwide. These summits provide crucial platforms for sharing knowledge and harmonizing energy policies across nations. However, political tensions among significant energy consumers and producers can undermine the effectiveness of these collaborations, leading to delays in the green transition.

13) European Commission, "Fit for 55: Delivering the EU's 2030 Climate Target on the Way to Climate Neutrality," https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal/fit-55-delivering-proposals_en accessed on 20 October 2024.

14) World Resources Institute, "Clean Energy Progress in the United States: Addressing Climate and Economic Goals," https://www.wri.org/insights/clean-energy-progress-united-states accessed on 20 October 2024.

Research Article

SUSTAINABLE POWER: TRANSFORMATIONS IN GLOBAL ENERGY SECURITY

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The evolving concept of energy security has shifted from a narrow focus on fossil fuel supplies to a broader framework that incorporates the stability of renewable energy systems and the infrastructure required to support them. As the climate crisis accelerates, the urgency of decarbonization has driven the expansion of renewable energy, yet this transition brings its own challenges. The need for resilient electricity grids, reliable energy storage, and a stable supply of critical minerals is now central to ensuring secure and sustainable energy. Additionally, geopolitical tensions are increasingly influencing energy strategies, requiring a balance between traditional and clean energy security concerns. The article highlights the complexities of navigating these competing demands and the strategies necessary to ensure a stable energy future in the face of geopolitical and environmental pressures.

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Keywords: Energy, Energy Security,
Environmental Pressures, Geopolitics, Sustainable Power.

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As Europe faced a winter energy crisis in 2022, triggered by the disruption of gas supplies due to Russia's invasion of Ukraine, energy security once again took center stage on the global agenda. Prices soared, and governments rushed to diversify energy sources. The crisis underscored the fragility of the current energy structure, but more importantly, it highlighted an urgent need for a clean transition and served as a powerful catalyst for accelerating the clean energy transition, which is expected to improve energy security.[1] Governments shifted their resources away from fossil fuels and redirected them towards clean energy investments. By 2023, global investments in clean energy are nearing two trillion dollars, almost double the amount spent on coal, oil, and gas.[2] Although the quick response and relatively mild winter helped mitigate the crisis, the clean energy transition required by the climate crisis,[3] along with rising geopolitical tensions worldwide, necessitates a fundamental shift in the approach to energy security.

Energy security, defined as the uninterrupted availability of energy at an affordable price[4] (IEA, 2014) has long been understood as the security of fossil fuels, namely oil and gas. Historically, energy security primarily meant ensuring access to these fossil fuels. The 1973 OPEC oil embargo was the event that first brought energy security to the forefront of the global agenda. A year later, in 1974, the International Energy Agency (IEA), which owns the definition, was founded in response to worries about disruptions in the supply of oil. However, with the growing urgency of the climate crisis and the fact that the most of carbon emissions worldwide comes from energy-related activities,[5] the concept is undergoing a significant transformation. In today's context, energy security is no longer solely about fossil fuels; it now includes ensuring stable renewable energy supplies. The increasing electrification of economies has made electricity security critical, requiring a stable supply, price stability, and resilient infrastructure. Critical minerals such as lithium, cobalt, and rare earth elements have become a top priority of energy security to decrease the dependence on traditional fossil fuels as these minerals are vital for clean energy technologies like electric vehicles (EVs) and photovoltaic (PV) systems. Also, rising

1) Anish Tailor, Andrea Pescatori, and Nicolas Van Zandweghe, "The Effects of Global Supply Shocks on Inflation in the US," IMF Working Paper, WP/24/006, January 2024.

2) International Energy Agency, "World Energy Outlook 2024," October 2024.

3) See, World Economic Forum, "Securing the Energy Transition," 2023, International Renewable Energy Agency (IRENA), "Global Energy Transformation: A Roadmap to 2050 (2019 Edition)", Abu Dhabi: IRENA, 2019, and Mustafa Tevfik Kartal et al., "Role of Energy Transition in Easing Energy Security Risk and Decreasing CO2 Emissions: Disaggregated Level Evidence from the USA by Quantile-Based Models," *Journal of Environmental Management*, Vol. 359, 2024.

4) International Energy Agency, "Energy Supply Security," 2014.

5) According to the IEA World Energy Outlook 2023 report, energy-related carbon dioxide (CO^2) emissions accounted for a significant portion of global emissions, reaching a record high of 37.4 billion tones in 2023. These emissions represented around 73-75 percent of total global CO^2 emissions, which mainly come from the burning of fossil fuels for electricity, transportation, and industrial activities.

geopolitical tensions, together with the urgent need to accelerate decarbonization to meet net zero targets, have brought nuclear energy back into focus as a key component of the carbon free energy mix. In short, energy security has evolved from a narrow focus on the protection of traditional fossil fuel supplies to a broader concept that now encompasses ensuring the sustainable progression of the clean energy transition.

The changing dynamics of energy security in light of the clean energy transition will be examined in this article. It will look at how energy security has changed from being centered on fossil fuels to emphasizing reliable renewable energy sources, price stability, electrical security through reliable supply, and the infrastructure required to support growing electrification. The role of energy efficiency in reducing demand and enhancing system resilience will also be touched upon. Additionally, the article will delve into the geopolitical risks associated with critical mineral supply chains, the role of nuclear energy in the decarbonization process, and the rising importance of securing resilient energy systems in the context of climate resilience. Finally, it will assess the necessary investments and policies required to modernize energy infrastructure, diversify supply chains, and ensure long-term energy security in a rapidly changing global environment.

Historical Context: The Evolution of Energy Security

Energy security has long been a significant issue for countries, traditionally centered on ensuring a stable and affordable supply of fossil fuels, particularly oil and gas. In this sense, the 1973 OPEC oil embargo was a turning point since it elevated the idea of energy security to the top of international political and economic agendas.[6] The economic shock that followed the dramatic cut in oil supply brought to light the vulnerability of countries that rely on imported oil, underscoring the necessity of diversifying energy sources and securing dependable supply lines. In response, the International Energy Agency (IEA) was established in 1974 to mitigate such risks by coordinating efforts to safeguard oil supplies and stabilize energy markets.

Energy security has long been closely linked to the geopolitics of gas and oil, with trade disputes, sanctions, and conflicts frequently causing interruptions in global energy flows. The necessity of protecting conventional fossil fuel sources is further highlighted by the ongoing geopolitical tensions in a number of areas, including the Middle East, Russia-Ukraine, and portions of Africa. Even while the shift to renewable energy is accelerating, oil continues to play a significant role in the world's energy mix, particularly in industries that are more difficult to decarbonize quickly, such heavy industry and transportation. For many countries, securing oil supplies,

6) Matthew Hagerty, "Europe's Energy Dependence and Lessons Learned from 1973." FactSet, 1 April 2022. https://insight.factset.com/europes-energy-dependence-and-lessons-learned-from-1973

primarily via strategic reserves and safeguarded trading routes, remains a top priority.

In the meantime, natural gas has maintained its significance as an essential transitional energy source, enabling the move towards cleaner energy systems and providing a lower-carbon substitute for coal and oil.[7] Natural gas offers the backup required to handle intermittency problems as renewable energy sources like wind and solar continue to grow, guaranteeing a steady and dependable power supply. Geopolitical dynamics, however, also affect natural gas supply chains, as seen in the 2022 European energy crisis, which underscored the Europe's dependence on Russian gas. This crisis emphasized the need for diversified supply sources and further investments in liquefied natural gas (LNG) infrastructure to bolster energy security during the transition period.[8]

Even if the energy landscape is moving toward renewables, the world is still heavily dependent on oil and gas, especially natural gas. The geopolitical risks related to these commodities continue to influence energy security policies, even though their importance diminishes. As countries accelerate their decarbonization efforts to meet net zero targets, managing the transition in a way that balances both renewable and traditional energy security will be essential in the coming decades.[9]

Electricity Security in the Age of Renewable Energy Expansion

The capacity for renewable energy has grown remarkably in recent years. Over 500 gigawatts of new renewable capacity were added globally in 2023, a 50 percent increase, with solar photovoltaics accounting for three-quarters of these additions. This is the fastest growth rate for renewables in over two decades.[10] Renewable energy investments have surged dramatically, reflecting the global push to decarbonize and enhance energy security. Clean energy investment is expected to double fossil fuel investments in 2024, with key areas like solar PV and wind accounting for a significant portion of this growth. Falling costs, the drop in prices of solar PV over the last decade, and strong government support have driven this shift.[11] Achieving both energy security and net zero goals is possible only through investments in renewable energy, as fossil fuel production conflicts with sustainability efforts.[12]

However, the increased reliance on renewable energy sources comes with new

7) International Monetary Fund, "World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis," Washington, DC: IMF, Vol. 2022, No. 10, October 2022, Chapter 3, p. 53-85.

8) Vlado Vivoda, "LN Import Diversification and Energy Security in Asia." *Energy Policy* 129 (June): 967– 74.

9) Anna-Alexandra Marhold, Towards a 'security-centred' energy transition: balancing the European Union's ambitions and geopolitical realities, *Journal of International Economic Law*, Volume 26, Issue 4, December 2023, p. 756–769.

10) International Energy Agency (IEA), "Renewables 2023: Analysis and Forecast to 2028", Paris, 2023.

11) International Energy Agency (IEA), "World Energy Investment 2024", Paris, 2024.

12) Serhan Cevik, "Climate Change and Energy Security: The Dilemma or Opportunity of the Century?" IMF. 9 September 2022.

challenges, particularly around electricity security. Unlike fossil fuels, renewables like wind and solar are intermittent, meaning they depend on weather conditions, which can fluctuate seasonally and even daily. This intermittency can lead to periods where there is either excess electricity or a shortage, putting strain on electricity grids. Additionally, IEA projects that electricity demand will increase six times faster than total energy demand until.[13] Therefore, grid infrastructure needs to be upgraded to handle the growing proportion of renewable energy sources and provide a steady electricity supply.

Electricity storage is also directly linked with this issue. The intermittency of renewable energy sources makes storage systems essential to deal with fluctuations in supply and demand. To this end, investment in battery storage is projected to exceed 50 billion dollars in 2024,[14] but more is needed to ensure that grids can handle the variability of renewable electricity. Upgrading grids and investing in storage systems are keys to managing these challenges and keeping electricity affordable for taxpayers.

Challenges in Critical Mineral Supply Chains for the Clean Energy Transition

As the world moves further into the age of electricity,[15] driven by the rapid expansion of EVs, solar PVs and other clean technologies, the demand for critical minerals has surged. Minerals such as lithium, cobalt, nickel, and rare earth elements are fundamental to the manufacturing of batteries, electric motors, and other key components necessary for renewable energy systems and the broader electrification of economies. These minerals are critical for ensuring the stability and performance of technologies that are at the heart of the clean energy transition.

A critical challenge facing the energy security is the mismatch between the supply of critical minerals and the ambitious climate targets set by governments worldwide. As demand for minerals like lithium, cobalt, and nickel continues to surge, which is driven by the rapid expansion of EVs, energy storage systems, and renewable energy technologies, there are growing concerns that the current supply chains may not be able to keep up. The long lead times required for developing new mining projects, coupled with the significant investment needed to scale production, pose a major challenge to meeting the rising demand for critical minerals. If supply and production cannot meet this demand, the prices of these essential materials will rise significantly, making the clean energy transition more costly and difficult to achieve. Renewable energy reduces dependency on fossil fuels, thereby enhancing energy

13) International Energy Agency (IEA), "World Energy Outlook 2024," Paris, October 2024.

14) International Energy Agency (IEA, “Electricity Grids and Secure Energy Transitions, Paris, 2023.

15) International Energy Agency (IEA), "World Energy Outlook 2024," Paris, October 2024.

security. However, any disruptions in the supply chains of critical minerals could affect the deployment of technologies like EVs and solar PVs and reverse these gains by increasing reliance on fossil fuels, which would be highly detrimental to global energy security efforts as the rate of electrification in the building and transportation industries mostly determines how quickly oil may be phased out.[16]

The second, and more significant, concern for the clean energy transition is the lack of diversity in critical mineral supply chains. Mining and processing of such minerals are geographically concentrated in a few countries, particularly China. China controls over 70 percent of the global production of rare earth elements and has a similarly dominant position in the refining of lithium and cobalt, essential for EV batteries and other renewable energy technologies. Also, China's dominant role in mineral refining—nearly 90 percent of refined rare earths and 50-70 percent of lithium and cobalt processing—means that any disruptions, whether due to trade restrictions or political conflict, could cause severe bottlenecks in the global supply of these materials.[17] Naturally, reliance on a single country for such a crucial segment of the supply chain poses significant risks to energy security, especially as geopolitical tensions rise.

In response to China's dominant position in critical mineral supply chains, the United States and the European Union have implemented significant policy measures to strengthen energy security and promote the clean energy transition. These efforts aim to reduce dependence on foreign sources of critical minerals, which are crucial for electric vehicles, renewable energy systems, and other green technologies. The Inflation Reduction Act (IRA) seeks to encourage domestic production of critical minerals and secure partnerships with allied nations, to ensure that the transition to clean energy is not vulnerable to supply chain disruptions. Similarly, the EU has initated the European Green Deal initiative and adopted its Critical Raw Materials Act (CRMA) to diversify supply sources, increase recycling, and boost domestic production. The key object is to position Europe as a more resilient player in the global race for clean technology dominance by reducing reliance on non-member countries.

The strategic focus of these policies is not just to secure materials but also to safeguard energy security. By fostering domestic supply chains and reducing reliance on a single dominant supplier like China, both the U.S. and the EU aim to protect their economies from geopolitical risks and market fluctuations. These policy responses highlight the intersection of green technology development and global energy dynamics, where controlling critical minerals has become a matter of strategic importance. The IRA and EU Green Deal signal a clear shift towards ensuring that clean energy expansion

16) Tailor et al. (2024).

17) International Energy Agency, "Global Critical Minerals Outlook 2024", Paris, 2024.

does not come at the cost of national security, while also fostering technological independence and resilient energy structure.

Key Policy Strategies: Energy Efficiency and Nuclear Energy

Looking at other policy options to boost energy security, energy efficiency also protects its historical significance for governments to bolster energy security. By reducing the amount of energy required to power homes, industries, and transportation, energy efficiency measures alleviate pressure on energy supply chains and decrease overall energy consumption. This, in turn, reduces a country's dependence on both fossil fuels and imported energy sources. Investments in more efficient buildings, appliances, and industrial processes can significantly lower energy demand, allowing nations to meet climate goals without increasing dependence to non-domestic suppliers. In parallel, efforts to inform the public about reducing demand have gained significant importance, especially for energy importers as it has been witnessed in the EU following the Russia-Ukraine war. For many countries, energy efficiency continue to be seen as the fastest and most cost-effective way to enhance energy security, providing long-term benefits while supporting the clean energy transition.

In a way that would have been unexpected 10 years ago, nuclear energy has re-emerged in governments' policy portfolios as a critical component of the global strategy to secure a carbon-free energy mix and ensure energy security as it serves both ends simultaneously. Nuclear power offers a stable and large-scale domestic alternative as geopolitical tensions, fossil fuel volatility, and the need for reliable low-carbon energy sources continue to shape energy policy. While countries like Germany have phased out nuclear energy, others, such as France, have extended the operational lifetimes of their nuclear reactors to meet their climate targets and energy needs. Notably, the recent launch of the Olkiluoto 3 (OL3) nuclear reactor in Finland has shown the benefits of nuclear power, leading up to a seventy-five percent reduction in electricity prices,[18] indicating that nuclear option is also significant to cope with soaring energy bills. Therefore, for developing nations, like Türkiye, nuclear energy remains a crucial element in achieving long-term energy security,[19] providing a stable power supply while reducing reliance on fossil fuel imports. Additionally, the development of SMRs may even open new opportunities for developing countries by providing a scalable and cost-effective solution for clean energy, despite that lack of know-how for such countries creates new forms of dependence. Still, their modular design, lower upfront costs, and faster construction times make them commercially

18) John Benny, "Nuclear Power Helps Bring Down Electricity Prices by 75% in Finland," The National News, May 2023, https://www.thenationalnews.com/business/energy/2023/05/14/nuclear-power-helps-bring-down-electricity-prices-by-RE-in-finland

19) Sohbet Karbuz and Barış Şanlı, "On Formulating a New Energy Strategy for Turkey." *Insight Turkey*, Vol. 12, No. 3, 2010, p. 89–105.

viable, offering flexibility and easier integration into smaller power grids compared to traditional large-scale reactors, making them viable options for developing countries.

Concluding Remarks

The concept of energy security has significantly expanded in recent years, evolving from its traditional focus on the uninterrupted availability of oil and gas to a broader framework that includes the stability of clean energy systems and the critical infrastructure needed to support electrification. In a world where geopolitical tensions have intensified, the diversification of oil and gas supply sources and ensuring reliable energy routes are still keeping its importance, but at the same time, it highlights the weaknesses of the current energy structure and emphasizes the need of prioritizing clean and reliable energy to ensure energy security. This shift reflects both the historical reliance on fossil fuels, even though today this has less importance, for energy security and the new challenges arising from the transition to clean energy.

At the same time, the climate crisis and the urgency of decarbonization have driven the rapid expansion of renewable energy capacity. While renewables help reduce the reliance on imported fossil fuels,[20] they introduce new challenges. First, the intermittency and seasonality of renewable energy sources like wind and solar require robust grid infrastructure, with significant investments needed to upgrade power grids to handle fluctuations. Second, the need for effective energy storage systems has become critical in balancing supply and demand, making the development of sustainable infrastructure essential to ensuring a stable energy supply.

Furthermore, the age of electricity has brought about the rapid electrification of transportation and industry, making the deployment of technologies like EVs and PVs crucial for reducing fossil fuel dependence. However, the rising demand for such technologies has also increased the need for critical minerals like lithium, cobalt, and rare earth elements. Unfortunately, the mismatch between supply and demand, together with the geopolitical dominance of China over these minerals created significant risks for energy security. Investments in diversifying supply sources and increasing production are urgently needed to close this gap.

In response to these challenges, governments around the world have begun to prioritize policies that address both energy security and the smooth transition to a green economy. The US IRA and the EU Green Deal represent significant initiatives to strengthen supply chains, boost clean energy investments, and ensure long-term energy resilience. Governments also benefit from other options of energy security policies portfolio. For instance, energy efficiency remains a key policy tool for

20) Fazıl Gökgöz and Mustafa Taylan Güvercin, "Energy Security and Renewable Energy Efficiency in EU," *Renewable and Sustainable Energy Reviews*, Vol. 96 (2018), p. 226-239.

reducing overall demand and easing pressure on energy supply networks. At the same time, nuclear energy, particularly with the development of Small Modular Reactors (SMRs), has re-emerged as a viable option for achieving a carbon-free energy mix, offering reliable, large-scale energy that can enhance energy security while supporting decarbonization efforts.

Looking ahead, the future of global energy security will depend on a careful balance between traditional energy sources and clean energy systems, with a strong focus on critical minerals, infrastructure development, and policy reform. Governments must continue to address the vulnerabilities exposed by the concentessential concentration ofl supply chains while accelerating investments in renewable technologies and grid infrastructure. The path to a smooth green transition will require sustained political will, international cooperation, and the strategic mobilization of public and private investments. The coming years will determine whether the global energy system can meet net-zero goals without compromising security.

However, the future of geopolitical tensions will also play a crucial role in shaping global energy security. Whether energy remains a competitive battleground or becomes an area for international cooperation in the pursuit of climate goals will determine the trajectory of global security dynamics. As seen in recent years, energy resources and supply chains could continue to be used as leverage in geopolitical conflicts, or nations might choose to prioritize collaborative efforts to achieve decarbonization and secure the clean energy transition. Unfortunately, the current global landscape, with rising tensions and fractured international relations, suggests that cooperation may be difficult to achieve in the near term, casting uncertainty over the future of energy security.

Research Article

THE ENCOURAGING PROSPECTS OF A "NEW GENERATION" OF THE SYNTHETIC FUELS

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The scarcity of resources, the tendency towards the fragmentation of the globalized world into semi-autonomous blocks, and the "third world war in pieces" require an acceleration in developing alternative products. Alternative fuels can complement or, in the future, replace traditional ones, allowing the same freedom of movement of people and commodities. Investments in developing e-fuels and HVO (Hydrotreated Vegetable Oil) diesel are increasing, and this suggests a growth of the market by 2030 because many plants will go into operation. These "new-generation" and green synthetic fuels have the advantage of reconciling the ambitious decarbonization objectives with energy security and freedom of movement; furthermore, unlike electric ones, they do not require a new engine – and related infrastructures – but can be fully integrated with the internal combustion engines currently in use. Finally, the availability of a valid and ready-to-use alternative to increasingly expensive traditional fuels is part of a broader strategy to govern the current phase of global turbulence.

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For last two years, Russia and the West have been competing in a destructive war. The first year of the war in Palestine is approaching, and the siege of Gaza brings new horrors every day. Lebanon has once again become a frontline, and the blockade of Suez and the substantial energy costs lead to the strangulation of European productive systems; on the other hand, sustainability is an objective that can no longer be postponed but it is difficult to reconcile it with energy independence. However, it cannot just be forgotten that we must find alternatives that allow us to maintain a standard of well-being. A concrete policy is needed, in line with the current phase, which starts from the principle of technological neutrality and favours the development of all energetical technologies and reserves. Given the international division labour and the unequal distribution of resources, it is practically impossible to achieve complete self-sufficiency; however, the fragmentation of the world into semi-autonomous blocks casts dark omens in the years to come, requiring the development of programs to integrate or replace some of the products or goods available to date (energy, fuels, food etc.). It is a pressing need, especially for transformation economies, such as the German and Italian ones (firmly integrated), which were based on the constant importation of raw materials they generally lack (low-priced gas, minerals etc.) to guarantee the population's well-being. It is not a simple path because it requires an abrupt transition to a completely different eco-social model. The guidelines must be to replace, save, produce, and eventually research.

To date, giving up the internal combustion engine is still prohibitive despite the encouraging prospects of electromotor. In the twentieth century, the choice to move towards the internal combustion engine, to the detriment of the electric one, was dictated by geopolitical reasons or by the wide availability of hydrocarbons made possible by controlling oil fields and pipelines. It is no coincidence that China, the "systemic adversary" of the United States, is the country that invests the most in electric motor development: a choice that is not only technological but truly geopolitical. Furthermore, it is complex to achieve the ambitious decarbonisation objectives set by the European Union without substantial intervention in the transport and mobility sector; but a new and more radical question has arisen: how to replace fuels more stably, given the ever-increasing costs and global supply chains becoming increasingly insecure? Moreover, the forced passage of Suez plays a central role in the supplies of oil and liquefied natural gas (LNG). From January to October 2023, according to the International Energy Agency, approximately 7.5 million barrels per day of oil and 36 billion cubic meters of LNG passed through the Suez Canal, approximately 10 percent and 8 percent respectively of maritime trade. This defeat situation may be an opportunity to review the policies of extreme dependence on imports, given the impossibility of replacing everything currently imported shortly.

Alternative Fuels: An Overview

Synthetic fuels have a long history. They can be obtained from coal, natural gas or biomass through a conversion process that can be direct or indirect, i.e., when the resource is first converted into syngas, and then becomes the final fuel. During the twentieth century, some processes were successfully applied to produce surrogate petroleum products, as in the case of the hydrogenation – using the Bergius Process – of coal or lignite, possibly also of bitumen and mineral oils (more widespread since the 1950s with catalytic hydrogenation). Since then, a critical issue has emerged: the high consumption of raw materials (for example, around 10 tons of coal overall for one ton of synthetic fuel). This process became obsolete after the Second World War due to the greater availability of low-cost hydrocarbons.

Today there is an entirely different situation, with prices which, in the two years 2020-2022, have grown by over 300 percent. Indeed, car, net of increasing costs (fuels, repairs, insurance etc.), will remain the most widespread and reliable means of guaranteeing freedom of movement. The internal combustion engine is still irreplaceable, having achieved a high-efficiency level thanks to technical perfection. Furthermore, the actual costs of electric cars are prohibitive for a large part of consumers compared to traditional ones, but there are also two further limits: the need for considerable investments in electric charging infrastructures, the technical limit in long-distance travel, the need to produce and accumulate additional electricity in a time of scarcity, the high costs of both the car and charging long charging, while outside temperature can affect battery performance. All this makes cars with internal combustion engines still useful and irreplaceable. However, if the engine cannot be replaced, the fuel can be replaced and if coal can no longer be used as a source for synthetic fuels, other sources can be used.

A concrete answer to the problem lies in the use of synthetic but green fuels. The prospects for developing alternative fuels are also promising owing to the substantial investments planned by international companies. They also make it possible to accompany the transition to electric, towards which all car manufacturers are moving with huge and long-term investments, in a softer way and without repercussions, safeguarding businesses, iconic brands and jobs.

Uses, Characteristics, and Critical Issues of the "New Generation" of Synthetic Fuels

There is a second generation of synthetic fuels, and the prospects for industrial development are encouraging. One of the most promising fuels is HVO (Hydrotreated Vegetable Oil) diesel: it is generated by a hydrogenation process of vegetables or fats that contain triglycerides or fats. To produce HVO you can use vegetable oil (palm

oil, rapeseed oil, used cooking oil, tall oil) or animal fat. The hydrogenation process removes all the oxygen present and highly purifies the oil (in this it differs from the less refined biodiesel). The product is a high-quality biofuel similar to traditional diesel but has some strengths and differences. From the evidence currently available it seems that, in addition to reducing CO2 emissions, this fuel, which is compatible with engines, also has less "impact" on the engine itself: the high cetane (70 points compared to 55 for the traditional one) improves the power on; It is also particularly suitable for colder temperatures. There are also structural limits to what is and remains a substitute, however excellent: the slightly higher consumption (around 3 percent) especially in medium-long distances and the lower lubrication of the engine due to the absence of sulphur. HVO is spreading in heavy transport, especially on extra-urban journeys. Neste Oil is currently the leader in global production with 4 plants and a capacity of 2.4 million tons. At the same time, Eni has launched Ecofining technology to develop biofuels, aiming to reach 2 million tons by 2025. According to Greenea estimates, global production can grow to around 30 million tons next year.

The production of hydrogen is more complex. This element is extremely widespread on Earth but rarely in pure form, so it must be produced. In this case, the process is unique: electrolysis, which can be with a renewable source, producing "green" hydrogen, or non-renewable; in this case, the hydrogen is "grey". Therefore, production requires not only a large quantity of energy but also a large quantity of water, to be drawn for example from the sea through desalination plants. Furthermore, technological and scientific development has not yet found an answer to the distribution, transport and marketing (unlike petrol it must be compressed) of this very useful, widespread and "difficult" element. This represents the main obstacle even if investments continue and the results are promising: last March, the first commercial-scale e-fuels plant became operational in Texas, producing fuel from green hydrogen for trucks Amazon.

It is worth underlining that in both cases a resource must be "extracted", be it vegetable oil, coming from plantations that require soil consumption, or hydrogen, with a process which, although it leads to a positive balance in CO2 emissions, does not represent a real alternative. Just as hydrocarbons are extracted, oils are "extracted": the underlying logic is the same, even if there are no processes or transformations that do not require a tax of some kind. However, this is not the objective of synthetic fuels which must replace traditional ones in a time of scarcity, high costs and a crisis in global trade. One of the great advantages of synthetic fuels is their compatibility with the engines currently in use: for example, Stellantis has stated that e-fuels are compatible with 24 families of endothermic engines sold in Europe in 2014, essentially 24 million vehicles they do not require any modification; furthermore, there would be an exponential reduction in emissions: up to 400 million tonnes by 2024. The European Commission's growing openness towards synthetic fuels also

derives from these considerations.

In any case, there are many projects and many production plants that will see the light by 2028, as eFuel Alliance informs while others are already operational or will reach full production by 2023: the Bell Bay project produces (2024) 70 thousand tons of e-methanol, the CAC Synfuel Plant has the objective of reaching one million tonnes (e-gasoline and e-kerosene), also very encouraging are the prospects of the NEOM plant which aims to produce green hydrogen via electrolysis (650 tonnes per day in 2026, together with 1.2 million tonnes of ammonia).

Conclusions

A historical cycle that began in 1945 is ending, with the violence that only history reserves for these phases. Hunger and war will characterize the coming years, as was the case in the 1930s, which was a preparatory time for the hegemonic war from which this structure was born. The directions are marked: inflation, which pulverizes savings, overflowing growth of public debt with severe risks of default, collapse of the world market, regionalization of the economy, and rampant social instability. The culmination is the new "piecemeal" world war, perhaps awaited by a new leap in violence, which will determine the new structure, with a leading country. These circumstances are leading to an evolution in technological and energy policies, with an ever-greater focus on self-sufficiency. As for transport, the electric will gain an important portion of the market in the medium term. China has invested over 200 billion in the electric industry, thus attempting to break the Western primacy of the car. From a shorter-term perspective, spendable alternatives to oil are needed to accompany the restructuring phase. New-generation synthetic fuels allow us to avoid oil costs and have much less impact on the environment, safeguarding the internal combustion engine. Just as LNG is the ready-to-use alternative to gas via pipeline, e-fuels and HVO are the most expendable alternative in the short term to replace fuels derived from hydrocarbons. Investments in the construction of plants, a regulatory framework to regulate the conscious and respectful use of resources and raising consumer awareness to "consume less" and "consume differently" will be fundamental. It is the era of scarcity.

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NOTES

The rapid pace of geopolitical change, the urgent necessity for sustainability, and the fundamental importance of energy security converge to shape our complex global landscape today. This issue of Transatlantic Policy Quarterly delves into "Change, Security, and Sustainability in Energy," offering insights from scholars and professionals on how regions and nations are navigating this pivotal transformation. This issue is also a testament to the diverse perspectives needed to address our global energy challenges. From Europe to Asia and the Americas, these contributors provide thoughtful analyses and innovative ideas for a sustainable, secure, and resilient energy future. We invite you to engage with these articles, each shedding light on the crucial crossroads of change, security, and sustainability in energy.

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