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per Concordiam

Journal of European Security and Defense Issues

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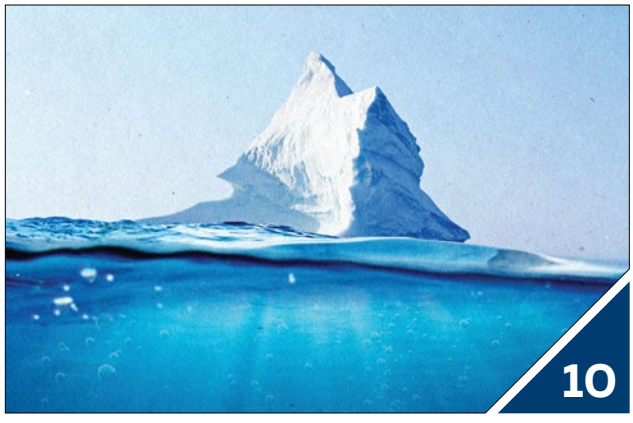

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On the Cover

Europe responds to Russia's energy weaponization with diversification and an expedited transition to noncarbon-emitting sources. PER CONCORDIAM ILLUSTRATION

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per Concordiam, *a U.S. European Command publication in coordination with the George C. Marshall European Center for European Studies*

Welcome to the 50th edition of per Concordiam. This long-planned issue is devoted to energy security, which affects every facet of international relations. It is a major concern for people, states and the global economy.

The complexities of the subject are beyond the reach of a single magazine issue. Thus, the focus here remains on Europe and primarily on natural gas as a source of energy, with an emphasis on the problems created by Russia's war on Ukraine — and hopefully some solutions.

This shifting European relationship with natural gas is therefore a major theme for our authors. Drs. András Deák and John Szabo, for example, point to the necessity for a credible EU plan to decarbonize natural gas consumption. They ask: Should our understanding of energy security be reconsidered? Also on the security front, Martin Vladimirov shows how the invasion of Ukraine exposed Europe's energy vulnerabilities. Key consumers such as Germany and Italy have accelerated efforts to decouple from Russian energy, yet many nations in Central and Eastern Europe remain dependent. The countries reliant on Russia's natural resources include those of the Visegrád Group — the Czech Republic, Hungary, Poland and Slovakia — whose energy infrastructure was linked to the former Soviet Union. Paolo Zucconi writes of the "deep division" within the group. Hungary and Slovakia, for example, continue to import Russian gas; the Czech Republic and Poland do not.

And what of a beleaguered Ukraine's response to its energy challenges? Drs. Natalia Slobodian and Svitlana Andrushchenko note that Kyiv has the potential to significantly contribute to European and global energy security. They write: "The Ukrainian experience in recovery and reconstruction, based on principles of decarbonization, sustainability, climate and a nature-valued approach, is unparalleled. This conflict — and lessons learned from it — can be a catalyst for Europe and other regions to accelerate their energy transitions."

As for energy transition, longtime per Concordiam contributor Dr. Pál Dunay illustrates how power generated from solar and wind — though still a small percentage of energy supply when compared with fossil fuels — is on the rise as nations continue their move to renewable energy.

As our authors document, there have been essential lessons learned in the past three years. The first is that the West can survive without Russian hydrocarbons. Second, states can overcome shocks if they maintain unity and are ready to accept sacrifices. Third, the entire process demonstrates good news about the resilience of our societies.

Still, separate from the severance of dependency on Russian hydrocarbon energy, countries must continue to reduce dependence on environmentally damaging energy sources and contaminating technologies. The West is leading the way, but the global process requires the support of every major producer and consumer alike. This needed collaboration may prove unusually difficult amid strained political relations.

One of our greatest challenges is achieving a secure and environmentally friendly energy supply. I hope you find this contribution to the conversation to be edifying and thought-provoking.

Sincerely,

Barre R. Seguin
Director

Barre R. Seguin

Director
George C. Marshall European Center for Security Studies

Barre R. Seguin retired from the U.S. Air Force as a major general in October 2020 after more than 31 years of active service. His last assignment was as the Deputy Chief of Staff, Strategic Employment, Supreme Headquarters Allied Powers Europe, Belgium. He entered active duty in 1989 as a distinguished graduate of the Reserve Officer Training Corps after graduating from the State University of New York at Potsdam. His flying assignments included serving as a flight examiner, instructor pilot, wing chief of safety and operations officer, with commands at the squadron, group, wing, and Air and Space Expeditionary Task Force levels. His command and staff positions included Commander, 9th Air and Space Expeditionary Task Force-Afghanistan and the NATO Air Command-Afghanistan, Kabul, Afghanistan; Director, Strategy, Engagement and Programs, U.S. Africa Command, Stuttgart, Germany; Commander, 31st Fighter Wing, Aviano Air Base, Italy; and Inspector General, Headquarters Air Combat Command.

Marshall Center

The George C. Marshall European Center for Security Studies is a German-American partnership founded in 1993. The center promotes dialogue and understanding between European, Eurasian, North American and other nations. The theme of its resident courses and outreach events: Most 21st century security challenges require international, interagency and interdisciplinary response and cooperation.

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TRANSACTIONAL SECURITY

Countries use a range of strategies to keep energy supplies flowing

By **Dr. Pál Dunay**, former Marshall Center professor

Power generated from solar and wind — though still a small percentage of the energy supply when compared with fossil fuels — is on the rise as nations continue their shared undertaking to transition to renewable energy.

Two considerations underline this process:

- Developed countries' intentions to reduce dependence on imported coal, oil and gas while transitioning to renewables such as solar and wind, which after major initial investment can be available to most nations and can provide a level of energy independence unachievable with fossil fuels.
- The campaign to slow down and then stop global warming through the reduction of carbon dioxide emissions.

As the world transitions from its reliance on fossil fuels to renewable energy sources, it may result in a wide redistribution of wealth and power. Countries whose wealth is based on the production of fossil fuels will lose economic power and global influence in the face of shrinking demand. Of course, such a process is somewhat predictable and potential losers may adapt to it. However, such a change also hurts domestic interests within these countries. Russia is a prime example: Where economic and political power are intertwined, there will be strong opposition to this transformation irrespective of whether it manifests itself in state capture by powerful interests (the 1990s) or state control of the economy (the 21st century). The longer the adaptation is postponed, the more loss accumulates. Russian experts have repeatedly called attention to this: Sberbank CEO German Gref said in 2016 that his country must "honestly admit that … the era of oil [is] over and … in the new technology-driven world the difference between the leaders and losers [will] be larger than during the industrial revolution." The scholar Lilia Shevtsova noted more generally that Russia's economy "is not diversified and is built on the commodity market." However, this is now changing quickly, not because the Kremlin is heeding these concerns, but to move to a war economy to support its aggression against Ukraine.

Turbines outside Palm Springs, California, use wind energy to power generators that produce electricity without burning fuel or causing pollution. REUTERS

If the move away from coal and oil continues — as well as increasing concerns about the burning of gas contributing to climate change and the safety of nuclear power

An excavator loads a truck at an opencast coal mine in India's Jharkhand state in 2024. Some large economies, such as India's, will lag in the transition to green energy. AFP/GETTY IMAGES

generation — there may be an even more radical departure from the recent past. It's an open question as to when methane from natural gas will be designated as a major component of energy-related carbon dioxide emissions, and if widespread concerns about the safe storage of used nuclear fuel rods could reduce the acceptance of nuclear power. These two matters have been diplomatically taken off the European Union agenda or deferred to a later time.

Although those are familiar risks, it is not feasible to instantaneously abandon every existent energy source. However, once the transition is accomplished, the world will be all the more exposed to a new dependence on renewables that present their own challenges. Primarily, electromobility will result in reliance on so-called rare earth metals, over which some countries, first and foremost China, would like to gain near-monopolistic control. Furthermore, the production of lithium batteries raises two issues: the contamination and/or depletion of water resources; and the processing of used batteries — an issue loosely resembling concerns over uranium rods. The challenges are enormous and the process is indeterminate. It could contribute to a further rearrangement of the energy sector, resulting in additional changes to the world economy.

As affluent Western democracies lead the transition to reduce, stop and, it is hoped, reverse global warming, success depends upon determination, leadership and influence. Decarbonization can be only a global success or a universal failure. For this reason, it is essential that the West succeed in its own backyard, where it controls policy, and that it be diplomatically and economically persuasive globally in places it does not. Western societies are somewhat divided on how swift, how radical the transition should be and how much cost is acceptable in moving toward zero global warming. At one end of the spectrum, there are radical environmentalists who are prepared to endure massive sacrifices to achieve the zero-emission objective as rapidly as possible. At the other end are opposing interests that will not hesitate to slow the process if it contributes to their political support or threatens their financial or economic positions. Regardless, economic tradeoffs will be required. Transitions of this magnitude come with not insignificant costs. Mainstream political forces must find the balance between staying on course and making the transition affordable, while ensuring steady movement toward carbon neutrality. It's clear that some large economies, such as India's, will lag behind the EU and North America, but short of largely unforeseen developments, it and most other countries will follow.

Globally, countries of the diverse developing world — and some in Europe — have pushed for financial and technological assistance, claiming they lack the resources

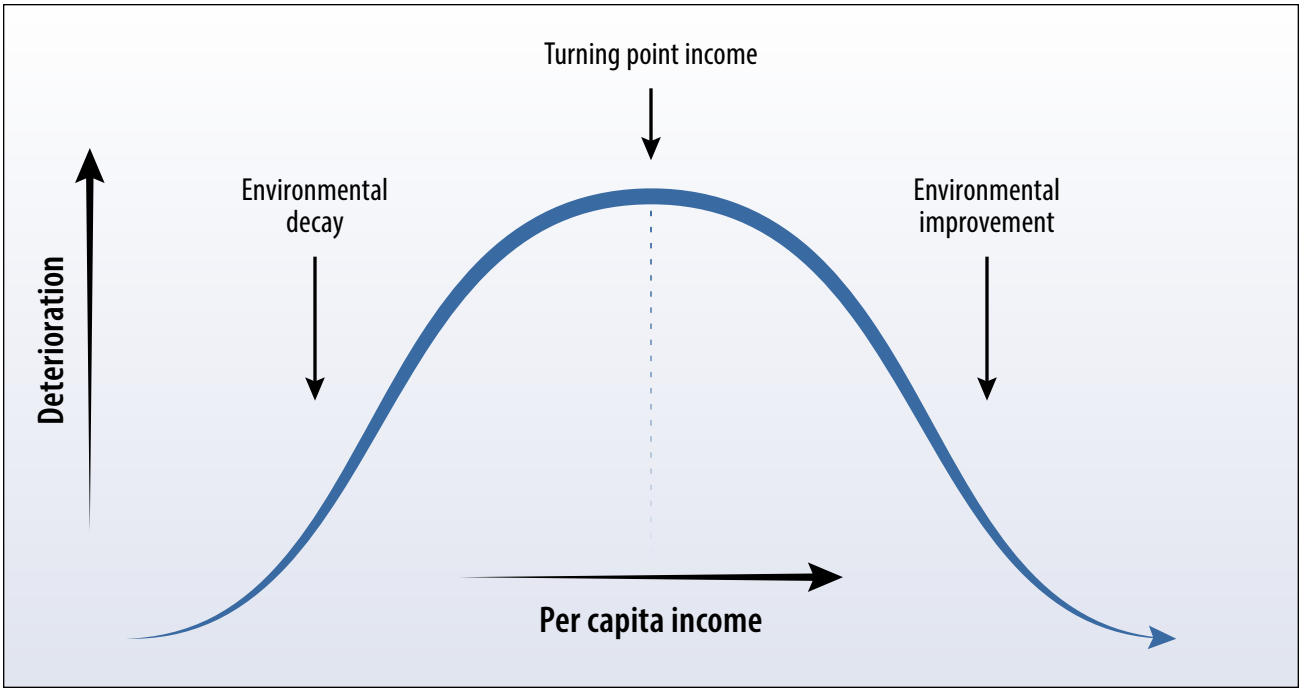
ENERGY SECURITY IS ALSO A HUMAN SECURITY ISSUE. CITIZENS IN ADVANCED AND PROPERLY ORGANIZED SOCIETIES EXPECT CONSISTENT ENERGY AVAILABILITY AT AFFORDABLE AND PREDICTABLE PRICES. IF, AND WHEN, THIS CANNOT BE PROVIDED, THEY MAY EXPRESS THEIR DISSATISFACTION IN WAYS THAT UNDERMINE SOCIAL COHESION.

necessary to abandon high-carbon technologies. In addition, many believe that rich, developed countries are obligated to provide assistance because, while now insisting that the rest of the world develop without exacerbating global warming, their development in past decades was fostered by industrial activities and technologies that heavily contributed to the current climate dilemma. This consideration is illustrated by the so-called Kuznets Curve (Figure 1). It shows the relationship between environmental degradation and per capita income, where pollution emissions initially increase with economic growth but then decline at high income levels, leading to environmental improvement.

The idea of energy security is a relatively new and developing concept found at the crossroads of state security and human security. States are more secure with a guaranteed and uninterrupted energy supply. Energy security is achieved when a country has energy reserves, a balance of supply and demand, and a balanced energy trade. Energy is more affordable and the system more diverse with an ample diversity of energy sources. Energy security is also a human security issue. Citizens in advanced and properly organized societies expect consistent energy availability at affordable and predictable prices. If, and when, this cannot be provided, they may express their dissatisfaction in ways that undermine social cohesion. It may seem that democracies are more vulnerable to social disruption from energy shortages and unexpected price hikes, but there is no supporting evidence of that. It is a misconception because democracies are typically quite resilient and can maintain popular support in spite of negative developments. Authoritarian regimes, on the other hand, can be shaken as a result of energy-related issues. For example, the "liberalization" of the price of liquefied petroleum gas in Kazakhstan in January 2022 was the immediate reason for an outbreak of demonstrations.

Every energy-dependent state develops defensive energy strategies to mitigate the risks and potential consequences

Figure 1: **The Kuznets Curve**



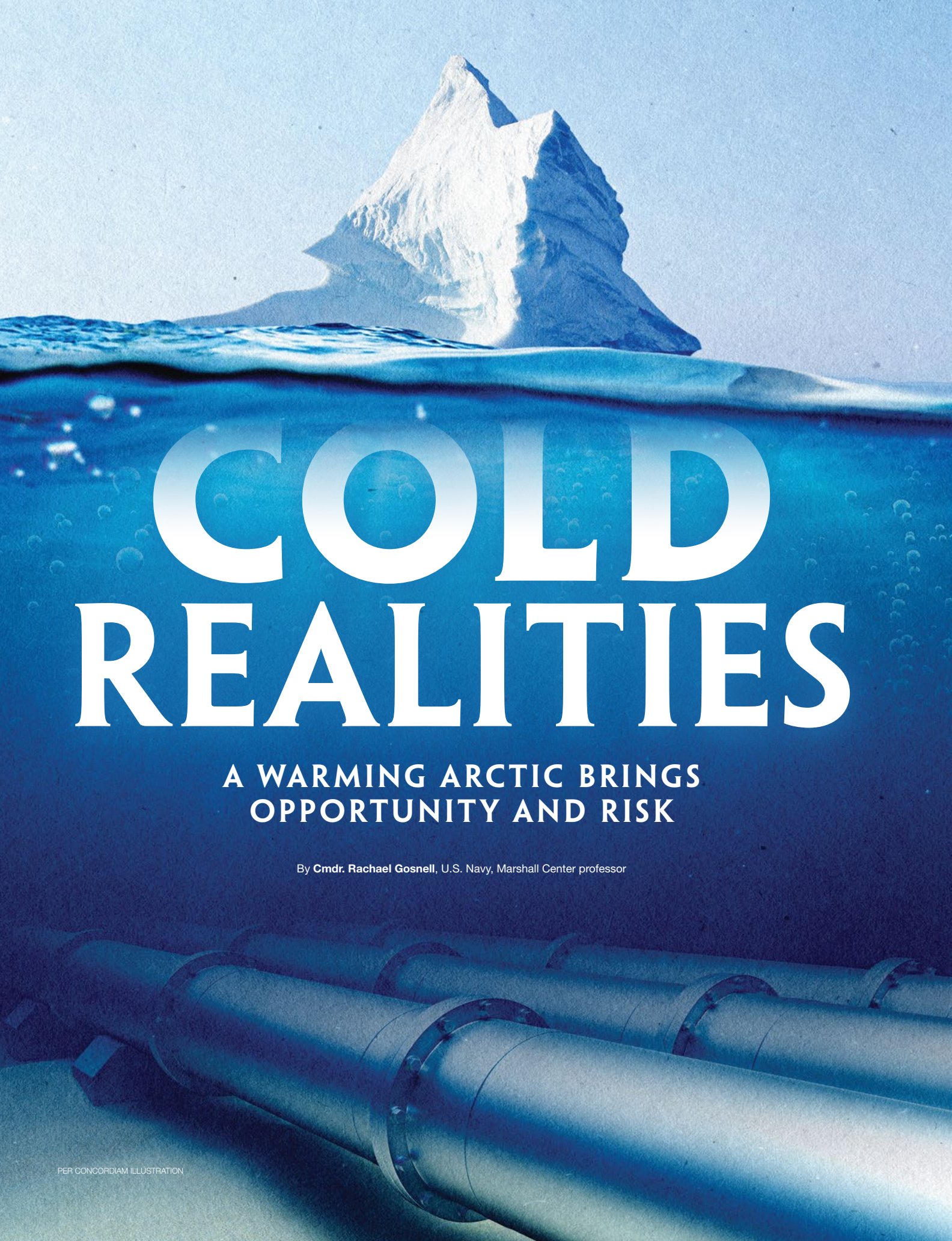
A load of household waste is deposited at the Istanbul Metropolitan Municipality's waste to energy plant, where a large claw collects it for recycling. The plant, which opened in 2021, was the first of its kind in Turkey. GETTY IMAGES

of its dependency. Such countries provide for their security through risk-mitigation measures, such as diversification of energy sources and suppliers, and entering technical deals, such as building energy reservoirs, complementary gas or oil supply lines and interconnectors, or electricity exchanges. All of this may result in perceived wasteful spending, but those costs should be measured against the potential risks of interrupted supply.

In turn, major energy-supplying states develop offensive strategies. Suppliers endeavor to secure a profitable dependency on their product. Suppliers are typically flexible and willing to expand their normal capacity limits, although, understandably, at higher prices. Maintaining such reserve capacity that can be activated also has extra costs for the supplier. For decades, Saudi Arabia had a monopoly as the source of an expanded, complementary supply of crude oil. However, when Russia created a shortage in the world gas market in 2022 — to create havoc and blackmail its European customers — it soon became clear that other major suppliers of Europe, such as Norway and Qatar, did not have sufficient supply flexibility to compensate for the shortage of Russian gas. Liquefied natural gas (LNG) from the United States provided the necessary reinforcement of Europe's energy supply, and now nearly half of total LNG imported by Europe comes from the U.S. We also learned that because of the rapid globalization of the world gas market, dependency on pipeline-based gas supplies is not nearly as severe as it was when, in the early 1980s, Germany was warned not to become dependent on Soviet gas piped from Siberia.

Because energy security is critical for every state, interrupting the energy supply as a form of blackmail might seem a good idea in the short run, but it is strategically unwise as it generates additional costs in lost trading partners and, more importantly, trust. Energy suppliers that are separate from and not controlled by a governmental political power would seem more trustworthy in their ability to provide a consistent and uninterrupted supply.

The focus of this edition of per Concordiam is on how Russia's energy trading partners have adapted in light of Moscow's aggression against Ukraine. The ongoing war of attrition emphasizes the need to quickly reduce dependency on Russian gas (as well as oil and coal). Even if the war ends soon — because of the structural changes to Europe's energy supply lines and increasing reliance on renewables — a return to imports of Russian fossil fuels will be partial at best or minimal at worst. There continue to be lasting structural effects on the world economy and international politics that complement other elements of an energy decoupling between Russia and the EU, and an ongoing global energy realignment. □



COLD REALITIES

A WARMING ARCTIC BRINGS OPPORTUNITY AND RISK

By **Cmdr. Rachael Gosnell**, U.S. Navy, Marshall Center professor

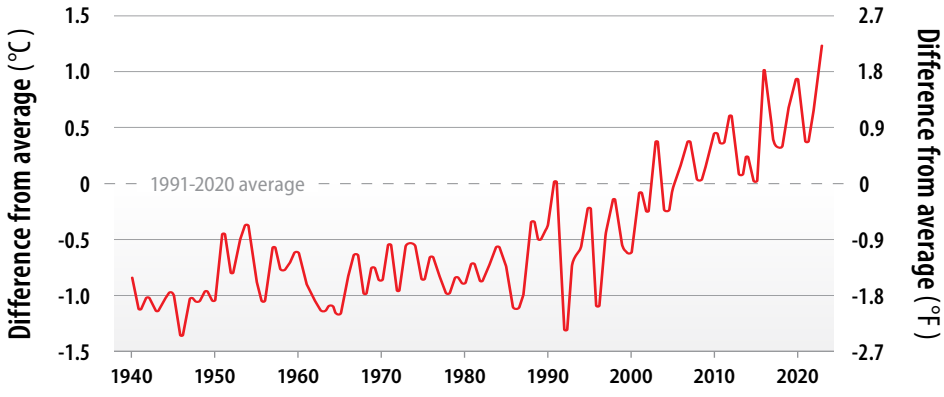
PER CONCORDIAM ILLUSTRATION

THE UNPRECEDENTED WARMING of the Arctic is heightening interest in the region's tremendous natural resources. As the global requirement for energy — and energy security — surges, many are looking northward to fulfill the demand.

There is no doubt that the energy resource potential of the Arctic is immense. The 2008 U.S. Geological Survey's Circum-Arctic Resource Appraisal (still considered the most accurate assessment of regional oil and gas reserves) estimates the Arctic holds more than 90 billion barrels of oil, 1,669 trillion cubic feet of natural gas and 44 billion barrels of liquid natural gas. This accounts for nearly one-third of the world's estimated conventional natural-gas supply and 13% of estimated global oil reserves. If developed, Arctic oil and gas could provide significant energy security for stakeholders, with a net worth estimated to be hundreds of billions of dollars.

The region further holds increasing allure as a maritime transit corridor, bringing valuable hydrocarbons to market. Moreover, fossil fuels are not the only energy resource of the region. The Arctic offers a plethora of sustainable energy as well, including hydropower, geothermal, solar, ocean and wind energies. Policymakers have begun to look northward, given the appeal of enhancing energy security through Arctic resources.

Figure 1: **Arctic temperature variations,** July-September average, 1940-2023



Source: NOAA

Yet the vast potential of Arctic energy also brings immense challenges in developing and utilizing the resources. Paradoxically, while the region holds sizable fossil fuel resources, it is also deeply affected by climate change, which is amplified by human activities, particularly the burning of fossil fuels. Warming at a rate of up to four times the global average, the region faces serious threats to its fragile ecosystem. According to the U.S. National Oceanic and Atmospheric Administration's (NOAA) Arctic Report Card 2023, the Arctic is "increasingly warmer, less frozen, and wetter, with regional extremes in weather, climate patterns, and ecosystem responses" due to climate trends.

To better understand the energy security potential of an increasingly warm Arctic, it is critical to first understand the complexities of the region. Even defining the Arctic can be challenging. There are more than a dozen definitions based upon environmental, human, geographic and geopolitical factors. While definitions vary, the most commonly accepted one is the region north of the Arctic Circle (66.5 degrees north), or the latitude above which the sun does not set during the summer solstice or rise during the winter solstice. The Arctic Ocean, while it is the smallest and shallowest of the world's oceans, is still more than five times the size of the Mediterranean Sea, encompassing about 14.09 million square kilometers. Arctic exploration dates back to the earliest Indigenous people, who settled the region as early as 20,000 years ago.

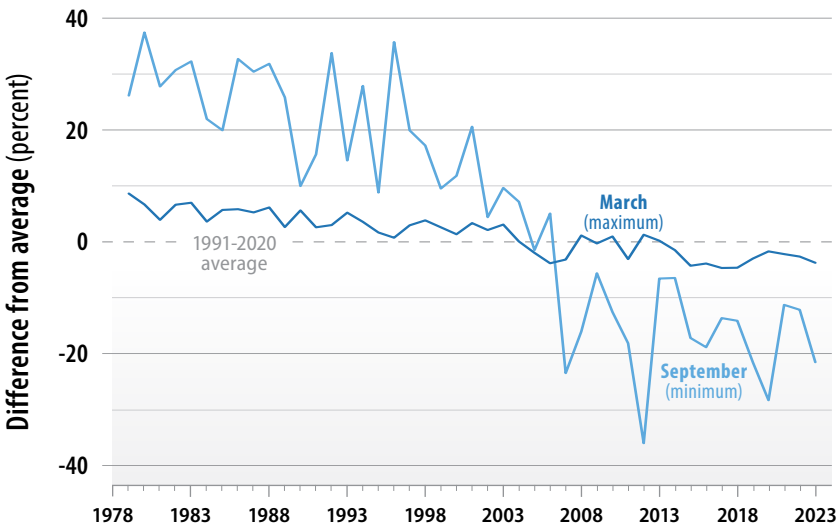
The Arctic is crucially strategic. During the Cold War, the predominant focus on the region centered on its airspace, which was the fastest route for strategic bombers or intercontinental ballistic missiles to traverse between the Soviet Union and the United States, or vice versa. However, the undersea domain was also quite active, given the attraction of hiding nuclear-powered ballistic missile submarines that assured second-strike capabilities under the ice. While natural resources have long been exploited in the region, moving those resources to market can be difficult. The potential for a northern maritime corridor connecting Europe with Asia has long held allure — and with good reason. The Arctic Ocean holds the potential to connect the Atlantic and Pacific oceans, uniting more than 80% of the global population and connecting global trade centers. With the unprecedented warming trends, the Arctic is evolving in many ways.

Although the Arctic will be affected greatly by climate change; it will continue to be a hostile environment. The North Pole, for example, still averages minus 40 degrees Celsius in winter. Though unquestionably cold, the North Pole is moderated by ocean water. The record low temperature for the Northern Hemisphere — minus 69.6 degrees Celsius — was observed on the Greenland Ice Sheet in 1991, according to the World Meteorological Organization. Russia's Far East routinely experiences temperatures that approach this record. The North American Arctic also experiences extreme cold, while temperatures in the Scandinavian Arctic tend to be more moderated by the jet stream. Though warmer, temperatures still routinely linger well below freezing and pose challenging conditions in which to live and work.

Indeed, it must be understood that each Arctic subregion — the European High North, North American Arctic and Russian Arctic — has unique geographic, hydrographic and climate characteristics that in turn drive the subregion's economic development, population and governmental approach.

The extreme cold notable across the entire Arctic region not only affects survivability but also the functionality of infrastructure and equipment. The Arctic cold is accompanied by frequent storms, ice and a long, dark winter. The melting of ice due to warming trends may worsen the region's weather with an increase in the frequency and severity of storms. These conditions have long limited the establishment of infrastructure in the High North and will continue to do so. Indeed, the regional population hovers near 4 million and is projected to only increase about 4% by 2030, compared with a projected 29% global population increase. The Russian Arctic holds about half of the regional population, which can be explained in part by Soviet policies to populate the region. In "Russia's Arctic Strategy through 2035: Grand Plans and Pragmatic Constraints," for the German Institute for International and Security Affairs, Janis Kluge and Michael Paul report that the Russian Arctic has seen a net outward migration of about 18,000 annually since the collapse of the Soviet Union. The pan-Arctic region — though home to many Indigenous communities — is notorious for challenging environmental conditions, poor infrastructure, lack of medical and educational support, gender imbalance and high cost of living.

Figure 2: **Arctic sea ice concentration,** March and September average, 1979-2023



Source: NOAA

AN OPENING MARITIME CORRIDOR

The Arctic has proved challenging to the many who have sought to explore and develop the region, but melting ice trends have again raised interest in a maritime corridor. The existence of a maritime route connecting the Atlantic and Pacific oceans was first surmised to exist in 1525. Russian Czar Peter the Great sponsored numerous expeditions to find this route, though it was not until the 1930s that the Soviet Union officially opened the Northern Sea Route (NSR). This route was originally conceived to resupply northern communities that were virtually inaccessible by other means, rather than to serve as a transit corridor.

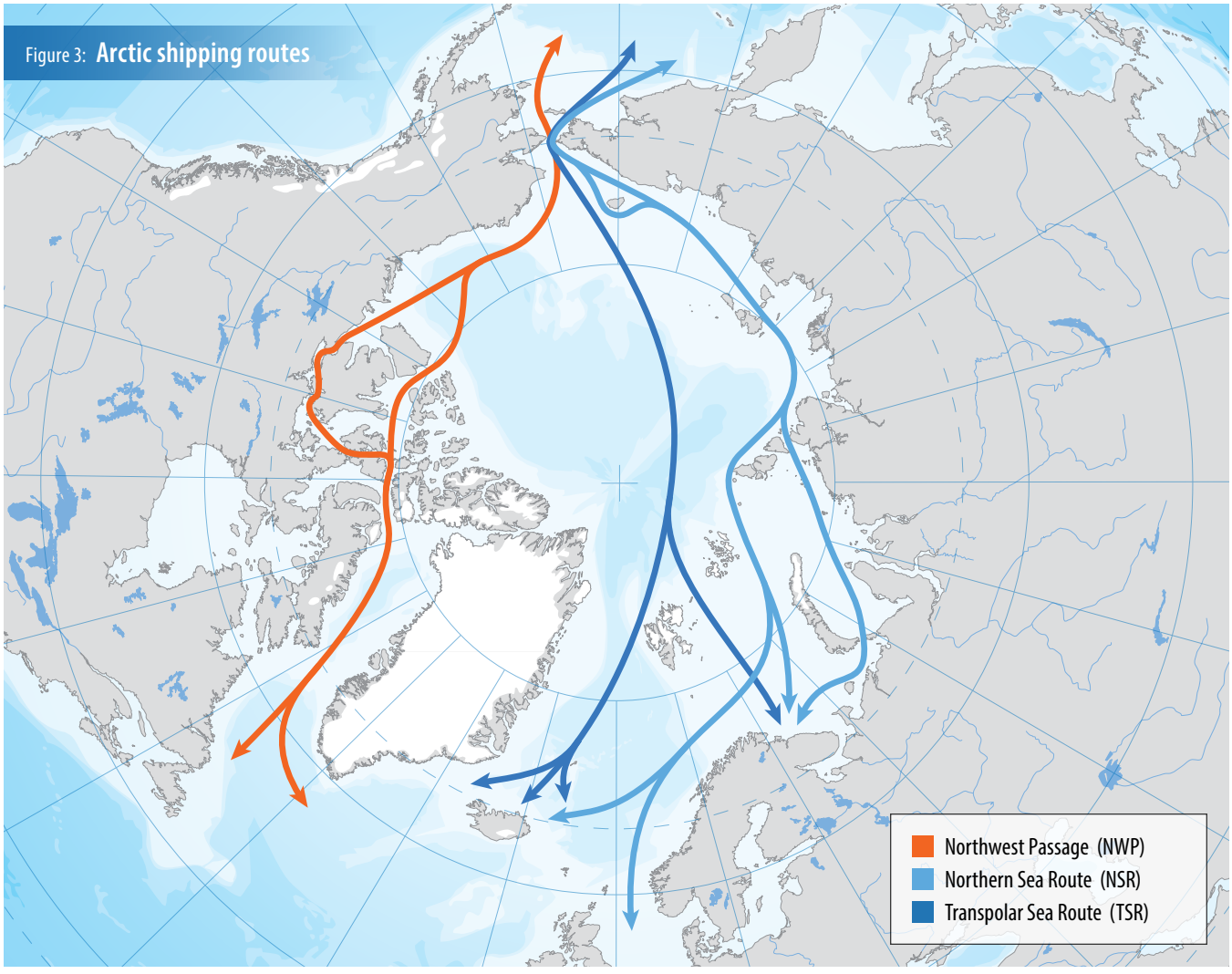
Current warming trends are piquing interest in the potential for the three northern maritime routes — the NSR along the Russian coastline, the Northwest Passage (NWP) along the Canadian coastline and the Transpolar Sea Route (TSR) through the Central Arctic Ocean. While the NSR and NWP have enabled limited maritime traffic for decades (and even longer if Indigenous travel is considered), both are increasingly being discussed as viable international transit corridors.

In 2011, Vladimir Putin, then Russia's prime minister, noted at the Arctic Forum that the "shortest routes between Europe's largest markets and the Asia-Pacific region lie across the Arctic." Many have seized on the distance to highlight the potential of the Arctic as a shipping corridor. The shipping route from East Asia to Northern Europe is about 11,200 nautical miles through the Suez Canal, but only about 6,500 nautical miles through the Arctic. This difference can decrease transit times by 12 to 15 days if weather conditions are good, though relatively few ships have opted to head north. In 2023, just 75 vessels with 2.1 million metric tons of cargo transited the NSR, compared with more than 23,000 vessels and more than 1.5 billion tons of cargo through the Suez Canal, according to the Northern Sea Route Administration and the Suez Canal Authority.

The commercial maritime industry's reluctance to use the NSR is largely due to risks associated with the lack of regional infrastructure — including accurate nautical charts and ports for resupply and maintenance — as well as extreme weather, challenging ice, a fragile ecosystem and a lack of reliable communications.

The inability to accurately predict transit routes and weather that can often cause delays of days or even weeks is potentially disastrous for an industry that utilizes a just-in-time supply model. The requirement for shippers to adhere to the International Maritime Organization's Polar Code for vessels in the Arctic, combined with high insurance rates and operating costs, continues to make Arctic transit a tenuous proposition for the commercial shipping industry until more infrastructure is established in the region.

Further, the vessels passing through the NSR and NWP are limited in size due to the draft limitations of those routes, meaning industry cannot take advantage of economies of scale with the newest bulk cargo vessels. Only the as-yet inaccessible TSR presents the deep-water option necessary for the workhorses of the world's shipping fleet — the deep-drafted very large and ultralarge crude carriers of more than 200,000 deadweight tonnage (such as the Aframax and Suezmax oil tankers) used on the main



Source: The Arctic Institute

trade routes between the Persian Gulf and Europe, North America and Asia, and between Africa and China. The largest ships, such as the container ship Ever Given (infamous for getting stuck in the Suez Canal), exceed the length of a U.S. aircraft carrier and have a draft of 14.5 meters. The Bering Strait poses some concerns, with a depth ranging from 30 to 50 meters. Even with the TSR expected to open for a limited window in the summer by midcentury, challenges will continue to plague all three Arctic routes.

Despite these limitations, the Arctic is seeing more regional activity — particularly such that enables the extraction and production of natural resources, and their shipment to markets. Vessel traffic on the NSR is approaching record levels as ships bring construction supplies for new energy projects in the Russian Arctic or deliver natural resources to market. A record 35 million tons shipped on the NSR in 2023, with the majority being liquefied natural gas (LNG) sent to market, in addition to 1.5 million tons of crude oil shipped from the Baltic Sea through the Arctic to Chinese markets. Activity stemming from construction of Arctic energy projects and shipping of natural resources will continue to rise. However, the attraction of shorter maritime routes often lacks a thorough understanding of the nuances of operating in the region.

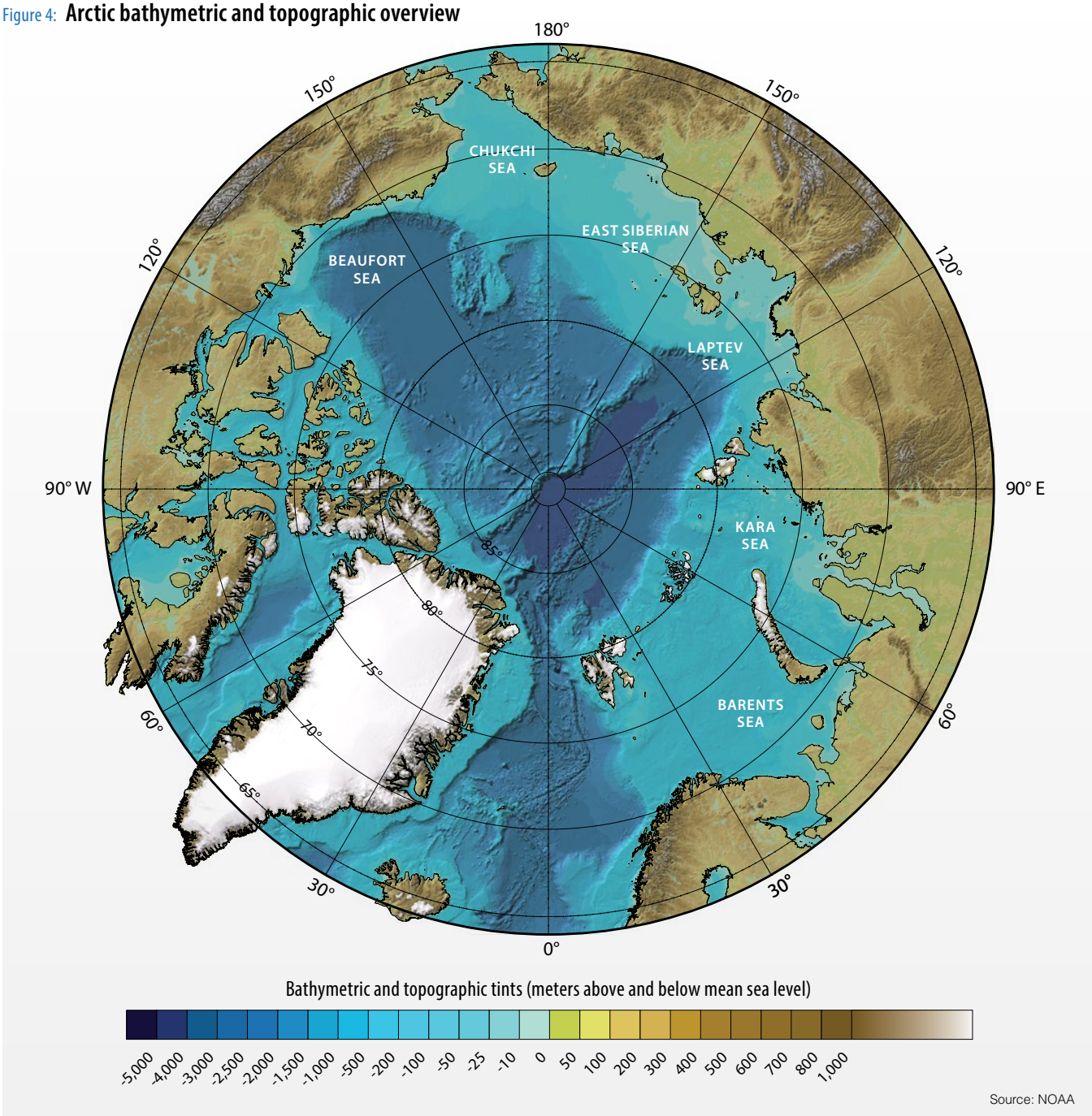
OPPORTUNITIES ... AND CHALLENGES

While a simplistic argument portends that warming temperatures driven by climate change will melt ice and enable greater regional activity onshore and offshore, the reality is far more complicated. Rising temperatures are indeed melting ice but also accelerating coastal erosion and permafrost thaw, and increasing the unpredictability of weather patterns that will affect operations at sea and ashore. Significant amounts of regional infrastructure — buildings, roads, pipelines, railroads and airports — are being damaged or destroyed by permafrost thaw. Nearly 70% of infrastructure in the Russian Arctic is vulnerable to these devastating effects. In 2021, Alexander Kozlov, the Russian minister for natural resources, highlighted the challenges of climate change on Russian Arctic infrastructure. He noted that 40% of buildings show signs of buckling and up to 29% of oil and gas production facilities can no longer be operated.

Low population density and insufficient infrastructure result in further challenges for development and extraction of natural resources. Indeed, the discontinuous electric grid infrastructure, designed for a small, dispersed population, further complicates local power generation.

Therein lies another Arctic paradox. While the region may

Figure 4: **Arctic bathymetric and topographic overview**



provide an answer to global energy security demands, the roughly 4 million Arctic residents will continue to face high energy prices, insufficient and disconnected power grids, and disruption to local communities unless more attention is given to implementing sustainable development practices that are mindful of the fragility of the ecosystem and local communities. Energy exploration, development and extraction in the Arctic is significantly more expensive and more challenging than projects of similar scale in warmer climates.

Yet, with rising global interest in the abundant energy resources of the north, there is no shortage of prospective stakeholders extending beyond the eight Arctic states (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the U.S.) to include China, Japan and South Korea, as well as the European Union. As world energy demands surge, nations are scrambling to locate new sources to power the future. The Arctic holds such resources, but their development will present challenges given the hazards of extraction in an inhospitable climate.

RUSSIA'S ENERGY STRATEGY

Prior to being hit with Western sanctions for the unprovoked invasion of Ukraine, Russia aimed to boost its Arctic production of LNG to nearly 100 million tons a year — or roughly 20% of the global market, Arctic Institute founder Malte Humpert reported in March 2024 for High North News. Yet, it is clear that the Arctic is no longer — if it ever was — immune

to global geopolitics. The war in Ukraine has halted cooperation between the West and Russia in the Arctic, ending the era of so-called Arctic exceptionalism. The Arctic energy business, brimming with potential and challenges, will be increasingly reflective of global geopolitics.

The Arctic will continue to fuel the Russian energy export market. The region currently accounts for roughly 90% of Russia's natural gas and 17% of its oil production. Before 2022, this translated into an estimated 20% of Russian gross domestic product, and 22% of its total exports originated in the Russian Arctic Zone, according to a 2017 paper for the Wilson Center. Current data is unavailable but likely to reflect previous trends. Yet, Moscow demands resources to sustain its war machine in Ukraine, which means shifting them away from fulfilling the economic and societal development goals of its Arctic strategy. Indeed, the lack of sufficient state funding for Arctic developmental goals has translated into the Russian energy sector being the key driver of new projects. These projects nearly always require local infrastructure upgrades to support the extraction, development and production of natural resources, as well as the transit of those resources to foreign markets.

The most significant Russian energy project in the Arctic, Yamal LNG, began commercial operations in December 2017. The project is serviced by a specially designed fleet of 15 Christophe de Margerie-class Arc7-rated icebreaking LNG carriers that have delivered about 1,250 shipments to Asia and Europe since 2017. A cooperative project between Aker Arctic Technology, Daewoo Shipbuilding and Marine Engineering, and Yamal LNG, the vessels are specially designed to service the Sabetta terminal, operating independently on the NSR during the summer and fall. Year-round navigation in the Arctic is made possible with icebreaker support, but transit times for the treacherous ice-covered Eastern route to Asia are much longer in winter. Experimental voyages have generally taken a month or longer, despite being escorted by powerful Russian nuclear icebreakers, making the westward route to either Murmansk or European ports preferable in winter.

Arctic LNG 2 is another Novatek-led, integrated natural gas production, liquefaction and shipping project under development, with an anticipated capacity of 19.8 million metric tons per year of LNG and 1.6 million tons per year of stable gas condensate. Planned as Russia's largest LNG plant, the project has been delayed by Western sanctions and the recent decision by China's Wison New Energies to discontinue work. Further, the specially designed icebreaking LNG carriers are facing delays after Western sanctions hit the shipyards building the fleet.

About 85% of Russian LNG production was originally intended for Europe — predominantly for transshipment to Belgium and France, according to Humpert. While the program was designed to sell LNG to both Asia and Europe, negative reactions to the invasion of Ukraine have forced Russia to look east. The Asian market has always enticed Moscow. In fact, the first shipment of LNG from the Sabetta terminal, loaded onto the Christophe de Margerie in December 2017 under Putin's eye, sailed to China.

Initially, sanctions targeting the Russian LNG industry — or the icebreaker tankers that bring the bulk of the resource to market — were limited. In 2023, European nations received more than 8 billion euros' worth of Russian LNG originating at the Sabetta terminal. Sanctions targeting LNG production facilities, the production of ice-class LNG tankers and Russian LNG markets will undoubtedly affect Moscow's grander plans to introduce more Arctic resources — particularly natural gas from the Yamal and Gyda peninsulas — into the global energy market.

The Vladimir Rusanov, an icebreaking liquefied natural gas (LNG) tanker, delivers its cargo at the LNG terminal in Nantong, China, in 2018 after its journey from Russia's Yamal peninsula. AFP/GETTY IMAGES

Thus far, the withdrawal of Western investment and technology has largely been made up for by Chinese companies. But the loss of Western markets will be challenging to overcome. Importantly, the loss of Western European ports to offload LNG will be costly. The icebreakers are generally more expensive to operate than standard LNG tankers, as sailing these vessels — optimized to operate in polar waters — in temperate waters incurs further costs. But perhaps most importantly, longer voyages to market will affect the amount of LNG departing from Sabetta. Currently, the ice-class LNG carriers transport more than 90% of Yamal LNG's production (some tankers with lower or no ice-class rating can operate in ice-free months). Longer transits to market mean a longer turnaround time to reload, which could ultimately lower productivity.

Indeed, this question already is surfacing for LNG projects under construction. With the 15 Christophe de Margerie tankers already committed to Yamal LNG, the next project to come online, Arctic LNG 2, will require 21 additional Arc7-rated ships. While four such vessels are close to completion, the remainder are entangled in Western sanctions. It is unlikely that South Korean shipyards will complete the fleet — and it is equally unlikely that Western technology incorporated into the design will be easily replaced while maintaining the same standards of efficiency and adherence to environmental regulations. An inability to ship product to market raises questions about the viability of Arctic LNG 2. Indeed, U.S. Assistant Secretary for Energy Resources Geoffrey Pyatt announced in November 2023 that the "objective is to kill that project" with

sanctions. It remains to be seen if China will again step in to provide alternatives to sustain this project or any other Russian Arctic energy projects envisioned.

While Russia will continue to monetize its Arctic energy resources, the impact of Western sanctions will take a toll. Russia's path in Ukraine could well determine the viability of its desire to fully exploit its northern energy resources. Meanwhile, turning to China as a substitute for Western investment, technology and markets may have far-reaching strategic implications.

AMERICA'S ARCTIC ENERGY BUST?

Despite Russia's lead in oil and gas exploitation in the Arctic — and the potential for immense energy resources — Western oil companies are reluctant to move ahead with projects in the American Arctic. Estimates from the U.S. Geological Survey note that the Arctic National Wildlife Refuge (ANWR) holds nearly 12 billion barrels of oil, or 27% of proven U.S. oil reserves. Yet the reaction to development opportunities has been remarkably cold. There are several explanations for this. First, the uncertain regulatory environment has dampened enthusiasm for Arctic resource development, particularly in ANWR.

But even with government support, the costs are high. Due to the harsh conditions, remote distances, lack of a resident workforce and absence of infrastructure, exploration, development and production of energy in the region is very expensive, particularly when compared with more accessible regions, such as the Gulf of Mexico or shale opportunities ashore. Oil companies must contend with moving exploration, development and production equipment, and workers to remote regions that experience extreme cold, limited sunlight and harsh weather. Limited summer thawing and daylight offer a small window of opportunity to achieve key development and construction milestones. Furthermore, there are reduced operating efficiencies for Arctic production because of the challenges associated with remote, isolated areas, as well as the difficulties of moving the resources to market via more expensive means, such as shipping or pipelines. When permafrost thaws, roads and pipelines are affected by instability and even collapse. As in the Russian Arctic, permafrost thaw will continue to pose threats even to existing oil and gas infrastructure, requiring higher operation and maintenance costs.

Energy companies must also contend with risks to the environment in the event of an oil spill. Indeed, the break-even point for developing oil in the Alaskan Arctic is likely around $80 per barrel, although some estimates put the figure closer to $100 per barrel for offshore production. Compared with the break-even price for the Gulf of Mexico, which hovers at just over $30 per barrel, according to Rystad Energy's modeling, the prospect of Arctic production is not a sound investment — even if the project could attain financing.

Most major U.S. banks have further ruled out financing new oil exploration in the Arctic, citing environmental policies advocating for mitigating climate change, reported Joseph Guzman for The Hill website in 2020. Environmentalists have long opposed drilling in the Arctic due to the probable negative impact on the fragile ecosystem and Indigenous peoples.

Perhaps the most notable example of the lack of interest was Shell's departure from exploration in the Chukchi Sea in 2015 after a failed attempt costing $7 billion. The lack of crude discoveries from its exploratory well, combined with high prices, environmental concerns and an unpredictable federal regulatory environment overwhelmed the potential benefits. Shell has not expressed an interest in returning. Indeed, the oil majors have largely steered clear of the Arctic because of these challenges. Energy data and modeling have shed doubt on the economic viability of production in ANWR and the broader U.S. Arctic.

THE GREEN REVOLUTION?

While much of the focus on Arctic resources is understandably on the vast reserves of fossil fuels, it is important to note the nascent movement toward developing the region's ample renewable resources. European High North countries have been leading in the development of green energy. Iceland is a world leader in developing renewable energy resources, relying on geothermal and hydroelectricity for nearly all of its

Carbon-free geothermal energy generated by plants, such as this one in Reykjavik, powers the majority of electricity production in Iceland. GETTY IMAGES

energy requirements. For geothermal power, Iceland ranks in the top 10 nations globally, with a power generation capacity of 755 megawatts — or about 70% of its energy production.

Iceland is, of course, uniquely suited to harness geothermal energy, given that it has more than 200 volcanoes spread across an island inhabited by just under 400,000 residents. The abundant energy source has enabled Iceland to become well known for aluminum production, but also for data centers, which are attracted to the area's low temperatures that naturally cool the facilities. The nation exports its geothermal expertise to global projects, making an even larger impact for a small nation.

Though a leader in renewable hydropower, Norway is itself an energy paradox. It is the seventh-largest natural gas producer in the world and also exports significant quantities of oil. Norway is a net energy exporter, with 87% of its energy production exported in 2020, allowing the nation to play a stabilizing role in global oil and gas supply — particularly as it helped to meet European energy needs after Russia's invasion of Ukraine. But the nation also has an extensive focus on renewables in order to transition to a cleaner energy model. In particular, hydropower resources make up more than 90% of its electricity generation.

Indeed, Norway is proving to be a model in the green transition. Other Arctic states are also pursuing green energy policies. Notably, Greenland is seeking to transition from a dependency on fossil fuels — and high import costs — to an entirely renewable energy system in the coming decades. The autonomous island, with a population of barely 56,000, is seeking to optimize its use of solar and wind energy. Hydropower already accounts for more than 80% of the island's electricity production.

The development of renewable resources in the Arctic region may yield a climate-friendly opportunity to achieve both energy security and limit further effects of climate change in a region being dramatically affected by warming trends. But this requires political will and significant investment in these technologies. Better understanding of how to store energy in the Arctic — where solar energy, for example, can only be captured for part of the year — will be a critical enabler in the green transition.

CONCLUSION

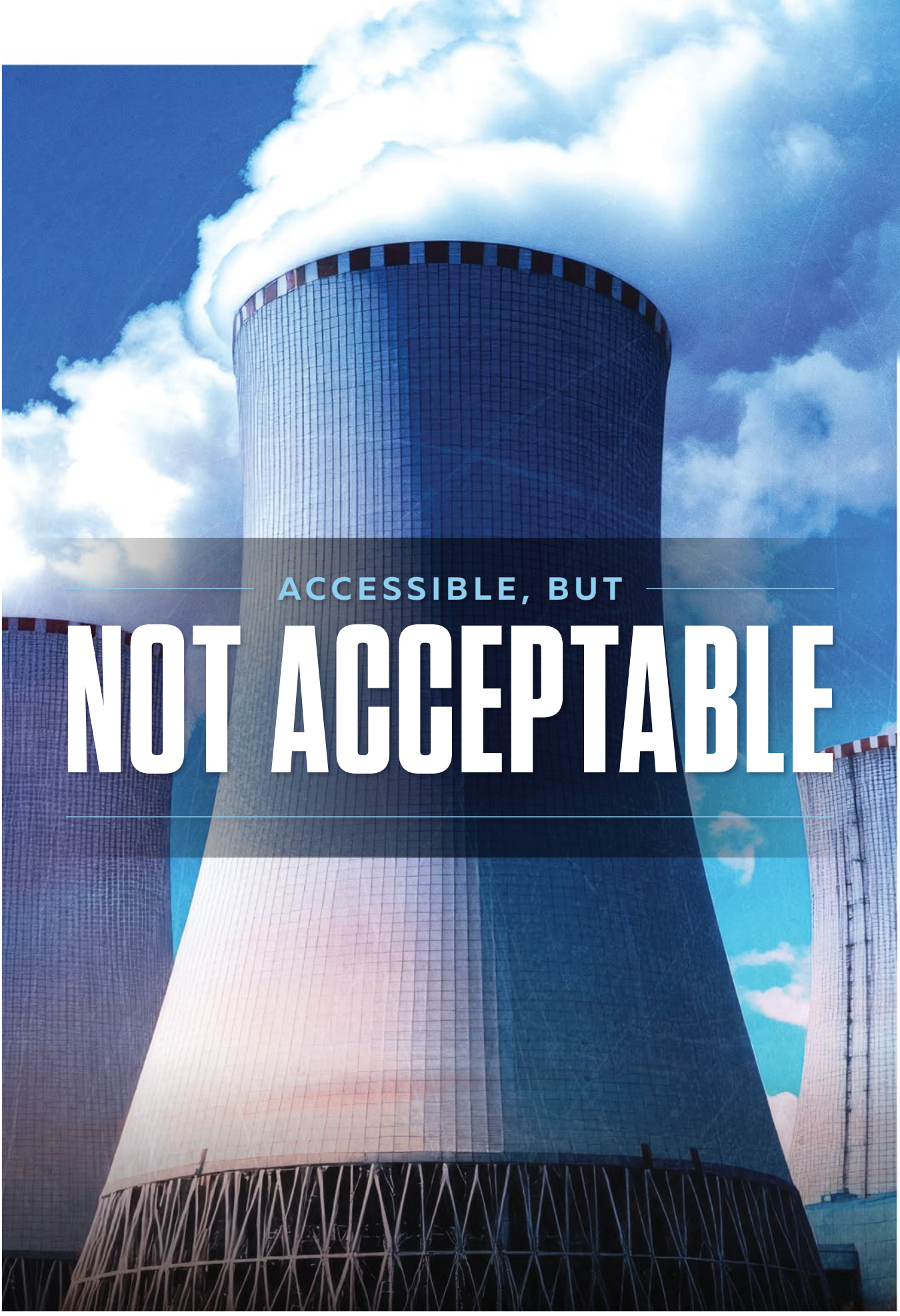
When combining its green energy potential with its proven and predicted fossil fuel reserves, it is clear that the Arctic has the potential to become a global energy powerhouse. The Arctic undoubtedly possesses trillions of dollars' worth of natural resources. Yet, the concerns of a resource curse are valid in a region long known for the inhumane treatment of Indigenous communities. The development of natural resources will deeply affect Indigenous and other communities alike. Perhaps a harbinger of potential conflict, the Norwegian Supreme Court ruled in 2021 that two wind farms built in Fosen violated Sami rights and disrupted traditional reindeer grazing lands. The Norwegian government apologized in early March 2024, and a deal was finally reached after three years of ambiguity that pitted Europe's largest onshore wind farm against the local Sami community, which has rights guaranteed under the United Nations. The agreement permits the partially state-owned wind farm to remain in operation, while providing compensation to the Sami with a share of the energy production, a monetary grant to strengthen Sami culture and a new area for grazing.

Sea ice melts along the Northwest Passage in the Canadian Arctic Archipelago in July 2017. Melting ice is making the Arctic more accessible for shipping and energy exploration. THE ASSOCIATED PRESS

The Norway case highlights the challenges faced by Indigenous communities — and by governments seeking to accelerate energy production. This adds another layer of complexity to the already significant challenges posed by climate trends, weather challenges and a significant lack of infrastructure and people to support regional energy development. Though resources abound in the region, it is expensive and difficult to extract them. Movement to market adds an additional layer of difficulty, as onshore options such as pipelines or rail grapple with the devastating effects of permafrost thaw on regional infrastructure. At sea, vessels must contend with unpredictable sea ice, lack of hydrographic data, limited infrastructure (particularly deepwater ports and crisis response capabilities), and high operating costs due to insurance rates and tariffs through the NSR. Thus far, financiers have opted to steer away from risky investments in the North American Arctic due to the combination of high costs, uncertainty of reserves and potential for environmental damage. Yet, Russia has doubled down on production, largely due to economic necessity.

The development of energy resources remains fraught with challenges that must be overcome to truly provide energy security to a region that is notorious for an inhospitable climate, vast distances, poor infrastructure and an abundance of climate-related difficulties, such as permafrost thaw, coastal erosion and ice melt. The allure of Arctic energy will require significant investments to realize the potential while preserving the fragile environment. □

The views presented here are Cmdr. Gosnell's and do not necessarily reflect those of the Marshall Center, the U.S. Navy or the U.S. Department of Defense.



ACCESSIBLE, BUT

NOT ACCEPTABLE

EUROPE'S SHIFTING RELATIONSHIP WITH NATURAL GAS

By **Dr. András Deák**, John Lukacs Institute for Strategy and Politics at the Ludovika University of Public Service, and **Dr. John Szabo**, Institute of World Economics at the Centre for Economic and Regional Studies

From the very day that European leaders entertained the idea of importing Soviet natural gas in the 1960s, many criticized the decision — citing supply security and geopolitical concerns. Dependence on oil and natural gas exports from the Soviet Union and, subsequently, Russia, continued to be regarded as geopolitically precarious and insecure. As the eminent scholar Per Högselius writes in "Red Gas": "Soviet natural gas, to a certain extent, did function, and was perceived of as an energy weapon and … it continues [to] do so in an age when the gas is no longer red." The negative image of Russian natural gas persisted — especially as the geopolitical situation between the West and Russia deteriorated after the "color revolutions" in the post-Soviet space in the mid-2000s — but the share of Russian imports continued to grow.

Russia's majority state-owned energy giant Gazprom substantially decreased pipeline flows of natural gas to Europe when Russia again invaded Ukraine in February 2022. The company's share of European Union gas imports decreased from more than 40% in 2021 to a mere 8% by 2023. Even if the Russian liquefied natural gas (LNG) imports that have increased over the past two years are included, less than 15% of EU imports originate from Russia. Only a handful of nations in Central and Eastern Europe, namely Austria, Croatia, Hungary and Slovakia, have chosen to maintain pipeline imports — decisions based on a combination of geographical and political factors. Nevertheless, European natural gas markets have undergone "de-Russification," inviting a reassessment of the future of natural gas in Europe.

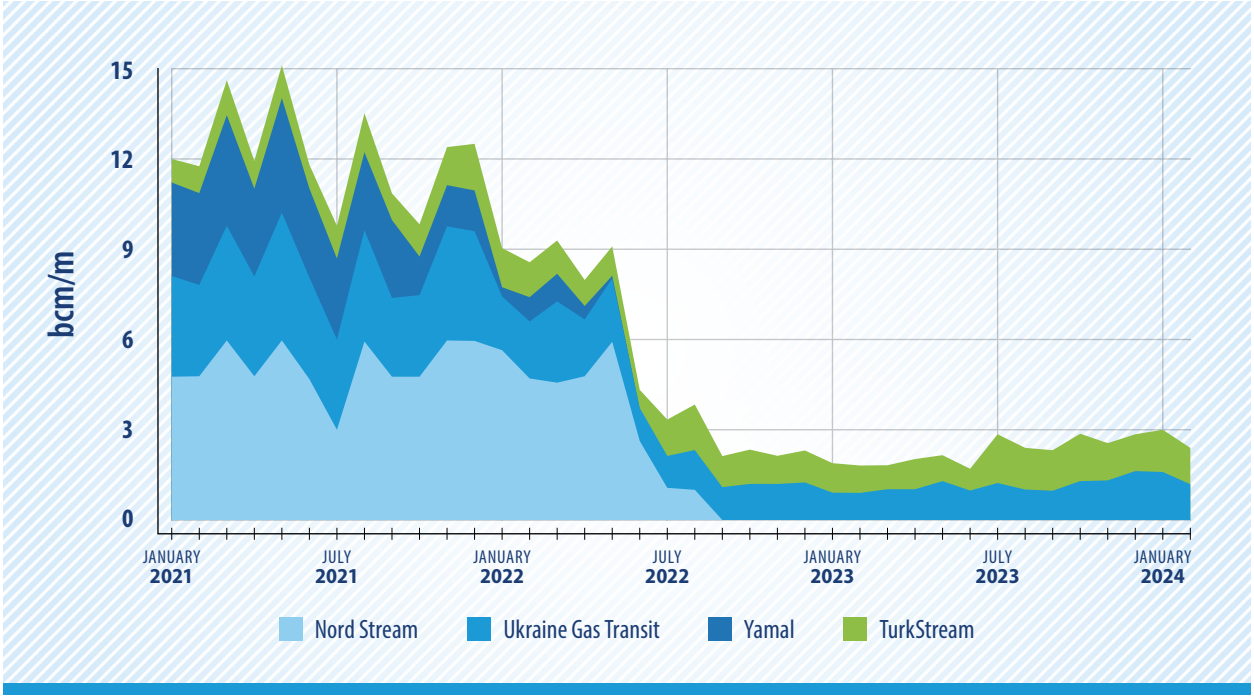
Will it again become a secure source of energy in a post-2022 setting? Will the removal of security concerns regarding natural gas enhance the fuel's prospects in Europe? As a point of departure, it is worthwhile to consider what one understands as energy security. For this, we turn to the Asia Pacific Energy Research Centre's seminal 2007 paper "A Quest for Energy Security in the 21st Century," which proposes four facets of energy security: availability, accessibility, acceptability and affordability. Availability considers whether deposits and/or production of the energy source are available. Accessibility looks at the geopolitical facet of energy security, including whether one can obtain the necessary access to the energy source. Acceptability narrows in on whether the given sociopolitical and environmental contexts make the consumption of the given energy resource permissible. Affordability looks at price and one's ability to pay.

Natural gas is abundant globally, leading to a focus on its accessibility and acceptability, with some indication of its affordability. The shift in Russian natural gas exports is likely to be permanent and the new supply reality will generally be more advantageous from an accessibility point of view. However, the acceptability of natural gas is confined by climate policy.

THE ACCESSIBILITY OF NATURAL GAS

The five-decade-long trend of Soviet/Russian natural gas exports to Europe came to an abrupt halt in 2022 when Gazprom slashed supplies to a fraction of previous levels (Figure 1). This prompted market restructuring that continues to date. The Kremlin clearly restricted supplies to exert strategic influence over European decision-makers, retaliate against Western sanctions, and inflict social and financial burdens on the target countries. This "gascraft" undermined Gazprom's established corporate reputation, violated several legal obligations and agreements, and is incurring significant financial losses. However, its objectives remain ambiguous and their effect questionable.

Figure 1: **Russian gas exports to the European Union by route, 2021-2024, in billion cubic meters per month (bcm/m)**



Source: Timera Energy, ENTSOG

The Kremlin's actions prompted the collapse of Gazprom's access to lucrative markets while barely influencing European foreign policy. EU member states were able to weather a heating crisis during the two ensuing winters as natural gas prices returned to prewar levels ranging from 25 to 30 euros per megawatt hour. Crucially, Moscow's gascraft had little influence on Western decisions to assist Ukraine or to sanction Russian entities. If the Russian leadership aimed to secure wide-ranging political concessions through this course of action, their endeavor failed.

The failure of Russian strategy could prompt a gradual reassessment of priorities and thereby lead Moscow to prioritize business over politics. This course can be supported by Gazprom's ambition to regain its market share and optimize the utilization of its idle Western Siberian capacities while fulfilling its tax obligations and generating profits for its shareholders. Concomitantly, it would also help the Kremlin regain political support by offering discounts to friendly European nations, in effect restarting the entanglement of politics and business as has been the case for decades in Eastern Europe.

As of April 2024, Gazprom was not restricted by any legal obstacles from increasing its shipments to the EU. The European Commission has proposed timelines for the complete cessation of Russian natural gas imports by the second half of the 2020s, but none of these have been adopted. Ironically, although Russian gas imports are not subject to EU sanctions, the possibilities for Russia to regain its market share are even dimmer than is the case with oil. It is illegal to buy Russian oil and petroleum products in the EU — apart from a few exceptions — even though the necessary infrastructure and supply chains are available and operational. However, if politicians opt to relax legal restrictions, Russia could resume oil exports in a reasonably short period.

Importing Russian natural gas into the EU remains legal. The lack of sufficient infrastructure for pipeline imports poses an obstacle to rapidly increasing flows. Out of the four primary transit routes that were operational before the war, Nord Stream was severely damaged, Yamal remains inactive and all flows on routes through Ukraine were ceased by Kyiv on January 1 when existing transit contracts expired. More than 200 billion cubic meters per annum (bcm/a) of existing and potential transit capacity has been compromised. Restoring these routes hinges on removing sector-specific sanctions and the emergence of European leaders who would lead an initiative to reconcile relations. Neither of these appear to be readily achievable.

With the closure of the Ukrainian route, Gazprom's only remaining operable pipelines are those on the floor of the Black Sea, which have a combined capacity of 47.5 to 50.5 bcm/a. However, the subsea pipelines running through Turkish waters are at risk of being sanctioned by the West. These risks undermine Gazprom's European export ambitions.

EU infrastructure capacity limitations restrict the reemergence of the prewar natural gas-market configuration. They prevent the resurgence of Russian natural gas, even in a crisis where global natural gas supplies are interrupted and Europe would need access to immediate supplies. Poland and Ukraine could dampen the shocks by reopening transits via the Yamal and Brotherhood

pipelines, respectively, but their normative stance toward Russia would make it unlikely that they maintain these routes in the longer run, even if the war were concluded.

The restoration of pipeline infrastructure hinges on peace in Ukraine, the end of Russian President Vladimir Putin's administration and looser technological sanctions. As time passes without significant increases in Russian deliveries, the European market is bound to consolidate while price levels and new contractual relationships stabilize. The lack of European incentives to relaunch Russian trade and the increasing complexity of Gazprom's return are both consequences of this newly forming status quo.

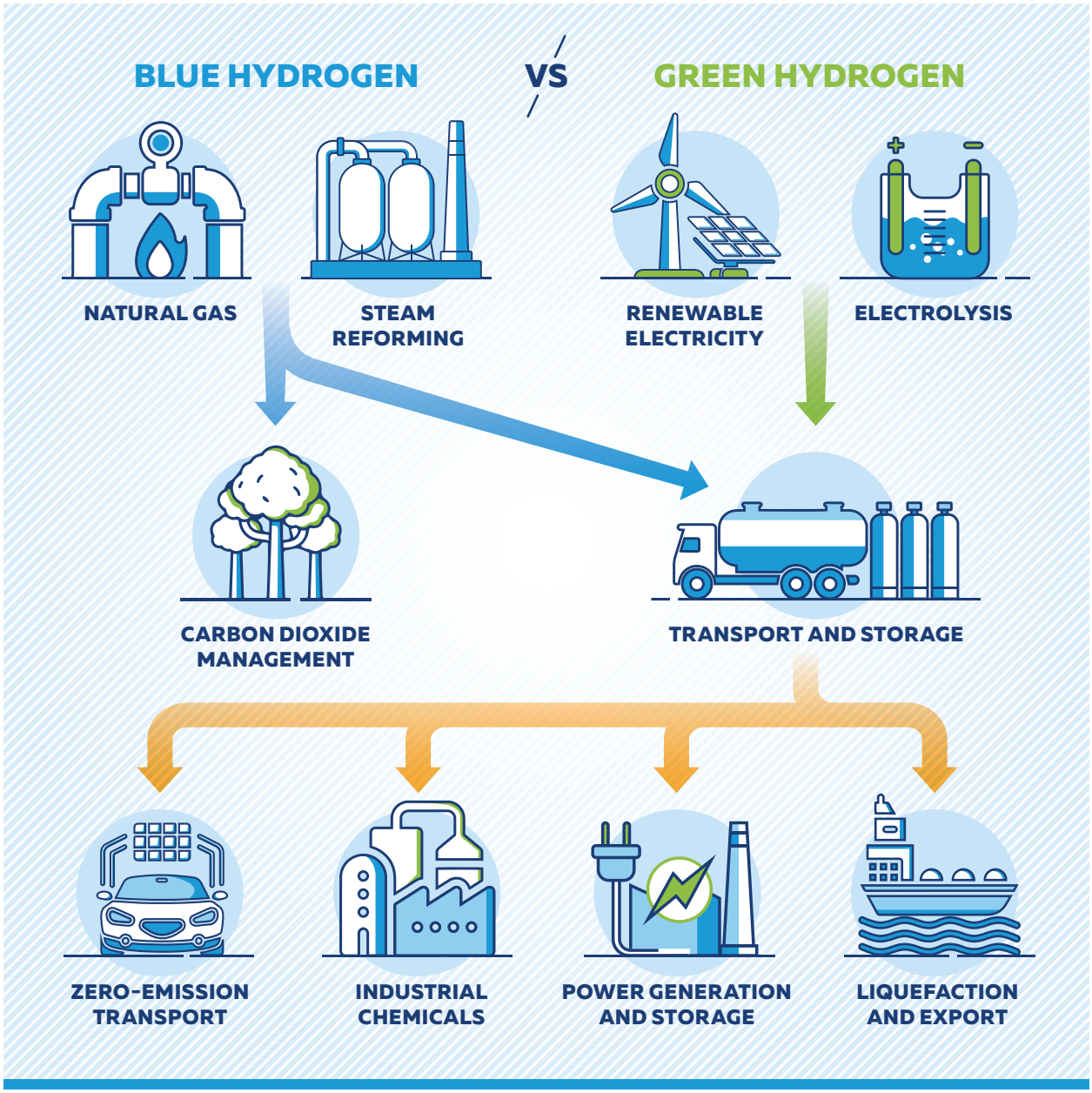
Europe responded to the halt of Russian supply by reducing consumption and diversifying import sources. Eurostat reports that EU natural gas demand in 2023 was 17.6% lower than the average annual demand from 2017 to 2021. Mild winters, regulatory and voluntary demand reductions, fuel switching and offshoring natural gas-intensive industries supported the reduction, some of which may be reversed as prices decline. Europe substituted half of the Russian supply losses with LNG. The United States became the primary source of imports, as U.S. LNG's share of the gas supply rose from 32.4% in 2021 to 69.1% in 2022, and further increased in 2023. This marks the reemergence of the U.S. as a key actor in Europe's energy affairs. U.S. LNG producers respond to market signals as opposed to administratively set targets, as was the case with oil prior to the 1970s.

European buyers compete with their Asian counterparts for U.S. LNG cargoes that are priced according to market principles without any discounts provided on "strategic grounds." Simply put, Europeans need to outbid competitors to secure access to the chilled fuel. The U.S. government has little influence over market prices and shipping destinations, unlike its ability to influence oil markets through regulation by the Railroad Commission of Texas during the first two-thirds of the 20th century.

Europe stands to benefit from importing LNG from the U.S. and other countries, as the depth of these markets increases the fuel's accessibility. Since 2000, the global trade volume of LNG has grown nearly four-fold, far outpacing the growth of pipeline gas and allowing for the formation of an increasingly interconnected — albeit far from perfect — global market.

In 2021, the volume of global LNG trade exceeded European LNG imports by a factor of five, indicating the depth of those markets, and their expansion is far from over as export capacities are expected to grow throughout the 2020s. In the U.S. alone, authorities granted permission for an additional liquefaction capacity of 120 bcm/a to be constructed by companies through 2030. New capacities will be easily accessible to European buyers given their access to the Atlantic Basin, while reducing shipping risks associated with Middle Eastern sources.

This Gazprom gas processing plant is located in Russia's Orenburg region. The state-owned energy giant substantially decreased pipeline flows of natural gas to Europe after the February 2022 invasion of Ukraine. REUTERS



Blue hydrogen can be produced from natural gas methane emissions through a steam methane reforming process.

Europe had to shift its natural gas import practices quickly and, in doing so, was forced to compromise. EU policymakers spent ample time and resources managing and "taming" a bilateral monopoly with Russia. They introduced policies that supported the unfettered, free trade of the resource by dismantling monopolies and long-term contracts, as well as eliminating take-or-pay and destination clauses. In a turn of events, European buyers' quick pivot forced them to accept terms from U.S. and Middle Eastern sellers that resemble Gazprom's from a decade or two ago. Offtakers, or buyers, made long-term commitments and agreed to pay a hefty premium to cover liquefaction, regasification, shipping, insurance and transit costs in addition to being subject to continuous market volatility. Previously, Europeans could rely on Gazprom's contractual flexibilities and ability to balance markets, but that has ended and leaves buyers susceptible to the vagaries of global events.

The reconfigured terms of trade translate into improved accessibility as the geopolitical disposition favors European buyers, thereby underpinning security, but come with a decline in affordability. LNG simply tends to be more costly than was the case with abundant Russian natural gas provided by a seller looking to grow its market share. It has become clear that this is a price most of Europe can and is willing to pay, facilitating the irreversible formation of new trade patterns.

The objective of energy security policies is rapidly changing. Leaders' ambitions to mitigate the geopolitical risks stemming from reliance on Russian flows were at the center of European actions for the past two decades.

ENERGY SECURITY'S ACCEPTABILITY DIMENSION HAS RISEN ON THE EUROPEAN POLICY AGENDA AS SOCIAL AND POLITICAL RESISTANCE TO CARBON DIOXIDE-EMITTING FOSSIL FUELS INCREASED OVER THE PAST DECADE.

In Eastern European countries, such as Poland and the Baltic states, the issue was effectively the only item on the energy policy agenda. The abrupt pivot in trade renders the matter moot and reduces the relevance of the accessibility facet to energy security. In doing so, it raises other facets.

THE ACCEPTABILITY OF NATURAL GAS

When the Asia Pacific Energy Research Centre (APERC) published "A Quest for Energy Security in the 21st Century" in January 2007, there was rising awareness among state officials of the need to take climate action both within Europe and beyond. Nicholas Stern had just published his book "The Economics of Climate Change: The Stern Review" and the Intergovernmental Panel on Climate Change (IPCC) was finalizing its Fourth Assessment Report. Both underscored the dire implications of unmitigated greenhouse gas emissions, backing the EU's decision to pilot its emission trading system and the European Commission's initiative to emphasize climate action in the Barroso Commission's 2020 Agenda.

Unsurprisingly, APERC also included "acceptability" into its conception of energy security, underscoring the need for energy sources that meet the "needs of the present without compromising the ability of future generations to meet their own needs." This concept drew on the United Nations' "Our Common Future" report published in 1987, but was something that had yet to be integrated into mainstream policymaking in the field of energy. Although discussions on the matter proliferated at the time of APERC's publication, its effect would be overshadowed by the economic crises and have little tangible effect until after the passing of the 2015 Paris Agreement.

Energy security's acceptability dimension has risen on the European policy agenda as social and political resistance to carbon dioxide-emitting fossil fuels increased over the past decade. Natural gas had been widely held to be a "clean," "green" and even "sustainable" source of energy, and policy sought ways to enhance its accessibility. But the fuel eventually came into the crosshairs of EU policymakers as an unacceptable emitter as they began to focus on electrification and renewable energy with the Clean Energy for All Europeans Package published in 2016.

As if jolted from their enchantment with natural gas, policymakers began to question the environmental implications of the fuel's continued consumption. Professors Kevin Anderson and Matthew Broderick underscored in a study for the EU that "fossil fuels, including natural gas, can have no substantial role in an EU 2°C energy system [EU strategy to achieve carbon neutrality and limit global temperature increases] beyond 2035," which raised concerns over the lock-ins created by costly investment in natural gas infrastructure. Moreover, a long-standing concern related to natural gas also rose on the EU's agenda: methane emissions.

The prime component of natural gas is methane, a potent greenhouse gas with a global-warming potential that is 28 times greater than that of carbon dioxide over a 100-year period and is 84 times more potent over 20 years. Thus, methane substantially accelerates climate change, even if its effects have been overlooked for years. The case of methane as a greenhouse gas is not nearly as straightforward as the unequivocal nexus between carbon dioxide and climate change because the Earth's methane balance is much more complex. Methane is emitted and absorbed by sources ranging from human activities to bogs, marshes and wetlands, making it more difficult to discern the precise role that people play in its changing concentration. Nonetheless, it is clear that human activity is at the core of generally rising methane concentrations in the atmosphere.

The International Energy Agency indicated that methane concentrations are rising, and studies have shown that just less than two-thirds of this increase is linked to human activity, a third of which originates from the energy sector. Methane emissions are closely linked to fossil fuels, as the gas is abundant between coal seams, within oil fields and, quite obviously, throughout the natural gas supply chain, from where it is vented and leaks into the atmosphere. Natural gas may widely be understood as the least-polluting fossil fuel because of its low sulfur, nitrogen and particulate matter emissions compared with other fossil fuels, but life cycle methane emissions can increase its warming effect to match that of coal.

The dire climate impact of methane emissions makes it especially pertinent that regulators introduce

a stringent framework on the measurement, reporting and verification (MRV) of emissions that can then form the basis of action targeting their reduction. An MRV system designed to curtail methane leaks is theoretically an easy decision, since it allows sellers of the resource to market and thereby profit from natural gas that would have otherwise dissipated. This is among the reasons that the European Commission introduced a methane strategy in 2018, which was followed with a regulation in May 2024. The acceptability of natural gas consumption hinges on the introduction of an MRV framework to convey that gas, while it has the lowest emission among fossil fuels, is not the low-emitting resource it has been systematically "greenwashed" to be.

The challenge with regulating the EU's methane emissions is that they are largely external to the bloc. It imports piped natural gas from Algeria, Azerbaijan, Norway and Russia in addition to the numerous sources of liquefied natural gas ranging from Australia through Qatar to the U.S. Of its piped suppliers, only Norway has a credible framework forcing producers and infrastructure operators to measure and curb their methane emissions. In other cases, both with regard to piped natural gas and LNG, MRV standards are, at best, in the planning stage. The sovereignty of gas-producing countries raises a challenge, as states are reluctant to cede any sort of oversight control over what are frequently state-controlled assets. Officials are not willing to grant observers access to their treasured assets and, even if they were to allow some form of oversight, there is still a need to harmonize codes, guidelines and regulations. The issues are similar with LNG. However, the EU is not without tools.

The EU can, and has, used its market size to impose conditions on suppliers. After all, it leveraged its buying power to force the liberalization of markets that were formerly controlled by vertically integrated companies. More recently, the European Commission introduced joint purchasing via a self-developed platform to help buyers access natural gas for storage. This covered a fraction of total EU demand, but it began to leverage the size of the EU's market by aggregating demand and instigating competition between sellers. The EU can grow this platform and use it to impose additional requirements on sellers, such as the MRV of methane emissions.

Beyond methane emissions, the carbon dioxide-emitting qualities of natural gas also undermine its acceptability in the energy mix. In principle, it can be consumed through 2035, but the EU would have to reduce the unabated volumes combusted to comply with targets set in the Paris Agreement. The EU no longer has the time to shift from coal to natural gas and then to renewables; it needs to quickly move toward renewable energy and cannot afford any unwanted lock-ins linked to natural gas assets. That said, it still needs to establish how it will substitute the fuel in the future.

Natural gas has a crucial role to play in meeting energy demand in difficult-to-electrify sectors, but its role needs to be limited to complementing renewable energy sources. Historically, natural gas was primarily consumed for industrial use, heating and balancing electricity generation. The energy transition has begun to alter its applications as the EU has substantially increased renewable energy production capacities and progressed with the electrification of its energy systems.

Natural gas will be less and less acceptable in electricity generation and increasingly costly to burn around the clock. Instead, grid operators will be forced to rely on gas turbines to balance the electricity network. The ability of these installations to quickly ramp up or decrease output makes them ideal to balance intermittent renewables. However, they will face rising competition from batteries, which are increasingly inexpensive while offering the option to store renewable electricity and dispatch it instantaneously.

Substituting for natural gas in heating — especially for industry — is set to take much longer than the pace at which it is phased out of electricity generation. In heating, its prime alternative is the heat pump, which offers a potentially renewable electricity-based mode of efficient heat production. The difficulty in this case is the vastness of the endeavor, as every household with a natural gas boiler must convert to this (or another) new low-carbon technology. Heat pump diffusion has grown in recent years, responding to high natural gas prices, generous government subsidies and government decisions to restrict natural gas boilers in new construction, but its uptake is from a low base and many households are reluctant to take on this technological change.

Substitution in the industry sector is among the most difficult and costly. The role of gas in producing high temperatures and as a feedstock in a host of processes, ranging from steel to fertilizer production, makes it a seemingly indispensable component of modern production. Electrification is not always palatable, leading experts to suggest the use of carbon capture and storage (CCS) and/or shifting to hydrogen as possible alternatives.

The long-term acceptability of natural gas usage is thus predicated on its decarbonization. Pairing natural gas combustion with CCS introduces a few issues, most prominent of which is the need to deploy the technology at scale. Very few CCS facilities are currently operational globally and, while their numbers have been growing, it is far from the pace necessary to support its widespread adoption. The EU has been frustrated with its slow rollout, but most integrated climate and modeling exercises indicate that it will be essential to keeping global warming below 2 degrees Celsius compared with preindustrial levels.

An alternative is to adopt hydrogen — a decarbonized form of natural gas — for a long-term role in the energy mix. The first element of the periodic table is already widely produced from natural gas and consumed

Vapor rises from cooling towers at the coal-fired Jaenschwalde power plant in Germany in 2019. The government plans to compensate the owner with up to $1.9 billion for leaving coal by 2038 as it moves toward decarbonization. REUTERS

as industrial feedstock in oil refining as well as fertilizer and methanol production. Hydrogen is produced by reforming natural gas through a steam-methane process. Pairing it with CCS could provide a low-carbon feedstock and potential nonemitting source of energy that extends the legitimacy of natural gas's continued use in European industry. Norwegian energy company Equinor, among the largest actors in this field, is developing projects in the North Sea. But here, too, the success of fossil hydrogen's uptake hinges on scaling CCS. An alternative technology may be methane pyrolysis — splitting the carbon from the hydrogen atoms without combusting the former — but this remains in an even more rudimentary phase of development.

CONCLUSION

The EU has been able to resolve many of its natural gas-linked energy security problems despite the shock of the energy crisis and Russia's decision to cut off natural gas supplies to most of Europe. It substituted for Russian gas imports with LNG from various suppliers. Mediated by the market and largely sourced from the U.S., this offered a geopolitically tenable solution to the EU's gas supply woes, as it could rely on an ally despite having to pay higher market prices. As the geopolitics and price of this energy source stabilize, the questions related to its security are changing.

The EU's climate agenda has been extremely slow to develop, with tangible effects on the energy system materializing over decades. However, it has now turned into an immense force that inhibits the unabated consumption of fossil fuels. Natural gas has long been seen as the transition fuel that would continue to play a substantial role in the bloc's energy mix for years, but for this to continue it needs to become more climate compatible. Reducing methane emissions is essential to allow for its use in an acceptable manner. Otherwise, the burning of natural gas contributes to exacerbating climate change and undermines the credibility of the EU's climate-mitigation ambitions. Development of a credible plan to decarbonize natural gas consumption is a long-term necessity that depends on the ability of companies to develop either CCS or alternative technologies. The EU may have overcome the resource, geopolitical and market constraints of natural gas, but its unfettered consumption is undermined by the environmental implications of its combustion. □

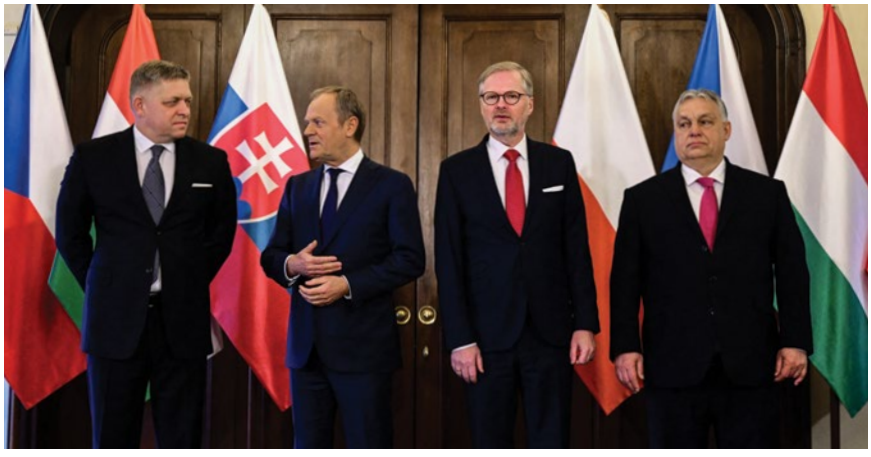
SAME QUESTION, DIFFERENT ANSWERS

How Visegrád Group countries approach Russian energy ties

PER CONCORDIAM ILLUSTRATION

By **Paolo Zucconi**, research associate, Leibniz Institute for the History and Culture of Eastern Europe

Russia, with its vast reserves of natural resources, has played a crucial role in Europe's energy security for decades, and even more so for the former Warsaw Pact countries whose energy infrastructure had been linked to the Soviet Union. That includes the countries of the Visegrád Group — the Czech Republic, Hungary, Poland and Slovakia — though today's energy relations between Russia and each of these countries vary in perspective and approach. For instance, while Slovakia emphasizes the historical ties and economic benefits of cooperation with Russia in energy matters, Poland expresses concern about dependence and geopolitical risk. Therefore, despite a significant decline in energy cooperation between European Union countries and Russia — following Russia's invasion of Ukraine in February 2022 — some countries in East Central Europe, including Hungary and Slovakia, continue to import Russian gas. The Czech Republic and Poland, however, do not, highlighting a deep division within the Visegrád Group.



The Visegrád Four prime ministers met in Prague in February 2024 to discuss energy security, the strategic agenda of the European Union and the prevention of illegal migration, among other issues. From left, Slovak Prime Minister Robert Fico, Polish Prime Minister Donald Tusk, Czech Prime Minister Petr Fiala and Hungarian Prime Minister Viktor Orbán. AFP/GETTY IMAGES

Even during their integration into NATO (1999-2004) and the EU (2004), the Visegrád countries continued to depend on Russian gas, oil and nuclear technology, which at that time was considered an opportunity to import cheap energy rather than a geopolitical threat. From 2005 to 2020, political movements with populist and authoritarian tendencies arose in the region. Some of these factions also displayed pro-Russian inclinations. Notably, parties such as Direction-Social Democracy (SocialNet Demokracia or SMER-SD) in Slovakia and the Federation of Young Democrats (Fiatal Demokraták Szövetsége or FIDESZ) in Hungary exhibited sympathies toward Russia and its leader, Vladimir Putin, and energy cooperation with Russia increased during that time.

The electoral successes of SMER-SD in Slovakia in 2006 and FIDESZ in Hungary in 2010 prompted significant shifts in those countries' foreign policies and reassessments of relations with Russia. Hungary's increasing isolation within NATO and the EU, particularly evident after 2015, led to closer cooperation with Russia as a means to avoid isolation in Europe. But Hungary's alignment with Putin and Russia continued, even after the full-scale invasion of Ukraine.

In Slovakia, SMER-SD governments demonstrated similar tendencies in their relations with Russia. However, Slovakia's political landscape — characterized by instability — tempered the dominance of any single party. SMER-SD's loss of power in 2020 led to a reduction in Russophile sentiment within the government. Therefore, Slovakia's alignment with the EU and NATO, particularly in supporting Ukraine, can be contrasted with Hungary's position on the war.

Czech attitudes toward Russia are more complex. Between 1993 and 2022, their perceptions of Russia were dominated by pragmatism, and mostly based on economic cooperation and energy affairs. This perspective can be observed in the attitudes of political leaders such as Václav Klaus and Miloš Zeman. Furthermore, the rise of the ANO 2011 party in 2011, whose leader Andrej Babiš openly called Russia an important economic partner, reflects this stance.

Russia's invasion of Ukraine in 2022 reshaped ties between the EU and Moscow, prompting widespread condemnation and the imposition of significant economic sanctions. While EU members such as the Baltic states and Poland led efforts to counter Russian aggression, others, such as Hungary and Slovakia, were hesitant to modify their relationships.

Dependence on Russian energy, particularly oil and gas, persists in Hungary and Slovakia despite declarations of intent by the Slovak government in 2022 to diversify energy imports. Although EU sanctions targeted various sectors of the Russian economy, sanctions against the energy industry remain contentious, partly due to opposition from Bulgaria, Hungary and Slovakia and the influence of pro-Russian and opportunistic political leaders such as Hungary's Viktor Orbán and Slovakia's Robert Fico.

The Hungarian government's reluctance to support Ukraine and resistance to energy sanctions strained relations not only with Western countries but also with neighboring partners such as Poland and led to tensions within the Visegrád Group. The complexities of energy cooperation

between Hungary and Russia underscore broader geopolitical implications for East Central Europe.

Christian Mölling, deputy director of the German Council on Foreign Relations Research Institute, noted in 2023 that Russia's conflict with Ukraine has revealed the fragmentation of the EU. This division is evident in the varying responses of EU governments and their perceptions of the Russian threat, including defense budgets, armament and ammunition supplies for Ukraine, and energy.

Hungary and Slovakia — Europe's new black sheep?

Since 1991, Hungarian foreign policy has consistently viewed Russia as an economic partner rather than an adversary. From 1991 to 2004, economic collaboration with Russia was deemed integral to national foreign policy objectives, albeit secondary to aspirations for NATO and Western integration. However, from 2004 to 2010, Russia emerged as a crucial energy supplier and a potential major trading partner.

A pivotal shift occurred with FIDESZ's election victory in 2010. This shift, as highlighted by Jan Zielonka and Jacques Rupnik in 2020, juxtaposed the rejection of an open society and EU interventions with a staunch defense of sovereignty that embraces an organic concept of the nation rooted in cultural and historic heritage. Consequently, Hungary found itself increasingly isolated within the EU and NATO, necessitating Eastern counterbalances, with Putin's Russia assuming elevated importance. In March 2007, FIDESZ leader Orbán, then in the opposition, denounced Russia's use of energy as a political weapon. But by 2009 — as the presumptive winner of the upcoming spring 2010 elections — he engaged in a seemingly impromptu meeting with Putin in St. Petersburg, documented online at the time by the blog Hungarian Spectrum, that seems much more important in hindsight.

Amid FIDESZ's expanding power and Orbán's intensified rapport with Russia, the Paks II Nuclear Power Plant agreement, signed in January 2014, emerged as a defining moment. However, divergent interpretations abound regarding the agreement's true nature, with critics labeling it as a conduit for Russian influence in the guise of economic collaboration. Zoltán Illés, a former FIDESZ legislator and state secretary for the environment until 2014, characterized the Paks deal as "camouflage" for a Russian financial transaction aimed at securing influence with Hungary's government. He suggested the deal focused more on injecting funds into Hungary's economy — particularly during Orbán's reelection bid in 2018 — than providing electricity. As of March 2024, only site preparation had taken place, although Alexey Likhachev, CEO of Russia's state-owned nuclear energy company Rosatom, and Hungarian Foreign Minister Peter Szijjártó claim the progress on construction is moving quickly. Despite lingering doubts, Hungary's alignment with Russia persisted, influencing its stance on geopolitical issues, including Ukraine. In May 2024, Czech President Petr Pavel pointed out that Hungary will remain dependent on Russia at least until the two new Paks II reactors are completed.

Since 2014, Hungary has increasingly bolstered ties with Russia, driven by divergent interests vis-à-vis the EU and NATO. Orbán's vocal opposition to EU sanctions and reluctance to support Ukraine underscored Hungary's growing estrangement from its Western allies. Moreover, Budapest's contentious maneuvers, blocking Ukraine's EU integration in addition to opposing EU sanctions against Russia, further solidified its alignment with Moscow. However, these efforts yielded little success, highlighting the inherent asymmetry in the relationship.

Despite the outbreak of war and subsequent tensions, the Hungarian government's stance toward its Russian counterpart has remained largely unchanged. While Western leaders have refrained from engaging with Russia directly, Szijjártó participated in several high-level meetings, including attending the Energy Expo in Sochi, Russia, and meeting with Likhachev in Uzbekistan.

Despite the significant geopolitical shifts resulting from the Russo-Ukrainian conflict, Hungary and Slovakia experienced minimal changes to their energy supply dynamics. The victory of SMER-SD and its leader Fico in Slovakia's September 2023 elections signaled a resurgence of Russophile sentiments that were temporarily concealed in the immediate aftermath of Russia's invasion. Meanwhile, efforts to diversify energy sources faced challenges. Slovakia pursued liquefied natural gas (LNG) agreements with several countries but struggled to find viable alternatives to Russian gas. Despite intentions to reduce reliance on Russian fossil fuels, progress has remained sluggish, hindered by political opposition and infrastructure limitations.

Within the context of EU-Russia relations, the debate over sanctions and energy security intensified. While all EU members, including Hungary and Slovakia, agreed on sanctions, implementing effective measures proved difficult. The Hungarian government opposed sanctions that threatened its energy supply from Russia, citing the need to safeguard national interests. At the same time, Orbán emphasized Hungary's commitment to green energy in his latest State of the Nation address in March 2024, highlighting plans for a rapid expansion in solar power and the construction of the two new reactors at Paks II NPP. He positioned Hungary as a leader in this transition, stressing the importance of efficient energy storage solutions and significant government investment in this area. Orbán portrayed the shift to green energy as vital for both environmental sustainability and economic growth.

Hungary's steadfast commitment to maintaining energy cooperation with Russia can be defined as opportunistic and diverges from broader EU strategies aimed at reducing dependence on Russian imports. Despite criticism and calls for sanctions, Hungary remains entrenched in its energy partnership with Russia, citing economic stability and national security concerns.

Nuclear energy presents unique challenges amid the geopolitical turmoil. Rosatom continues nuclear exports to Europe, with Hungary notably increasing nuclear fuel imports. Efforts to diversify supply have faced obstacles, including technical complexities and contractual obligations, prolonging dependence on Russian nuclear technology.

Hungary's energy policies underscore its distinct position within the EU, prioritizing stability and self-interest amid geopolitical uncertainties. Despite EU sanctions and calls for diversification, Hungary is maintaining a delicate balance between regional alliances and national imperatives. Hungary's April 2024 gas deal with Turkey, to import about 4.5 billion cubic meters of Russian gas each year via Turkish pipelines, shows Hungary intends to maintain this direction.

Since February 2022, Slovakia has been seeking alternative sources of oil and gas, driven in part by industry demands for renewable energy sector reforms. Despite these calls for change and the government's intention to reduce reliance on Russian fossil fuels, progress has been slow.

Slovakia boasts robust gas connections with neighboring countries, thanks to a diversification program initiated by the European Commission in 2013. In her contribution to an article for the German think tank Friedrich Ebert Stiftung in 2023, Veronika Oravcová, of the Slovak Foreign Policy Association, highlights Slovakia's achievement in establishing reverse gas-flow capabilities and completing new interconnectors with all neighboring countries: Austria, the Czech Republic, Hungary, Poland and Ukraine. These efforts have facilitated access to the LNG terminal in Świnoujście, Poland, with the first tender launched in mid-November 2022. However, discussions on revitalizing dormant projects or expanding existing ones face opposition from political parties, such as SMER-SD, and local communities. This is particularly true regarding the construction of infrastructure such as wind-power projects. Consequently, despite the intention to diversify energy sources, the actual implementation of projects and reforms is complex, further complicated by the victory of SMER-SD in the latest national elections.

The giant liquefied natural gas (LNG) tanker Al Nuaman, carrying some 200,000 cubic meters of LNG from Qatar, arrives in the Baltic port of Świnoujście, Poland, in December 2011, the first delivery to the LNG terminal. Świnoujście became critical to maintaining Poland's energy security and that of neighboring states when gas from Russia was cut off after the invasion of Ukraine. THE ASSOCIATED PRESS

The Czech Republic's differing perspectives

Russia, with its history, economy, power and culture, has long been a controversial and influential force within Czech society. According to Jan Holzer, a political scientist and professor at Masaryk University, for two centuries, Czechs have "tended to project into Russia their visions, dreams, and illusions, which in their majority stemmed from dissatisfaction with the imperfect political realities of their own societies." This complex relationship has been marked by alternating periods of cooperation and tension, reflecting broader shifts in international dynamics and domestic political landscapes.

In the early 2000s, the Czech government focused on increasing exports to Russia to reduce its trade deficit, which was due largely to significant energy imports. Energy cooperation became a key element of economic relations between the Russian Federation and the Czech Republic. This relationship is a legacy of the Cold War — particularly a 1955 agreement on nuclear energy between the Soviet Union and Czechoslovakia — and has resulted in an uninterrupted energy supply. Following the Cold War and until the Nord Stream pipeline became operational in 2011, the Czech Republic served as a crucial transit country for Russian gas heading to Western Europe, including Germany.

In 2003, the Templin Nuclear Power Plant, equipped with Russian-designed VVER-1000 reactors, began operations and became the largest source of electrical power in the country. The Czech Republic has traditionally been a net exporter of electricity due to its domestic coal resources and nuclear power generation. Although it began diversifying its energy supply in the 1990s, by 2014 the Czech Republic still imported about 60% of its gas and oil from Russia — but it remains less dependent than neighboring Slovakia.

Before the late 1990s, the gas transit corridor through Ukraine, Slovakia, the Czech Republic and Austria was the

sole export route for Russian natural gas to Europe. The Yamal pipeline through Poland, which began operations in 1999, began a shift to new export routes, a trend that continued with implementation of the Nord Stream pipeline through the Baltic Sea in 2011-2012, connecting to the Czech gas transmission system via the OPAL pipeline in Germany.

By 2015, the Czech Republic's natural gas imports came primarily from two sources: Russia's Gazprom and a consortium of Norwegian companies. This situation has remained relatively unchanged, although the Nord Stream 2 pipeline, one of Europe's most controversial energy infrastructure projects, placed the Czech Republic in a complex position between its sponsors (German-Russian business ventures) and opponents, such as the Polish and Slovak governments.

In terms of nuclear power technology, the Czech Republic has been dependent on Russia for many decades. In 2018, then-U.S. Energy Secretary Rick Perry warned the Czech government against partnering with Russia for its national nuclear energy plan, emphasizing that Russia uses energy as a political weapon and advocating for United States nuclear suppliers as a safer, more reliable option. Perry's visit to Prague was part of efforts by the first administration of U.S. President Donald Trump to persuade East Central European countries to import natural gas from the U.S. and other suppliers instead of Russia. As of 2018, Russia was the main gas supplier for many countries in Europe, including Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Poland, Romania and Slovakia, with these countries each receiving 75% to 100% of their natural gas imports from Russia.

Furthermore, until the general elections of 2021, when then-Prime Minister Babiš lost the premiership, the Czech government was hesitant to phase out fossil fuels, particularly coal, which significantly contribute to climate change. The EU's Green Deal, aimed at initiating a transition from fossil fuel to carbon-free energy sources, poses challenges for the Czech Republic, a landlocked and mountainous country. At the COP 26 United Nations Climate Change Conference in Glasgow, United Kingdom, in November 2021, Babiš strongly criticized the Green Deal and the European Commission's proposals, arguing they could have devastating social, economic, political and geopolitical impacts on Europe, potentially leading to societal tensions, empowering radicals and threatening democracy.

February 2022 and the onset of war in Ukraine found the Czech energy sector dealing with significant challenges, primarily a heavy reliance on imports of energy commodities — crude oil, petroleum products and natural gas — from Russia. For decades, this dependency created significant risks of supply shortages or shutdowns, with potentially severe consequences for the Czech economy. Although nuclear fuel was also a concern, it was not as critical due to existing stocks at both of the country's nuclear power plants. Changes in legislation, development of renewable energy sources and maintaining a sufficient fuel base for electricity and heat production created additional challenges. Finally, there were policy shifts sparked by EU decarbonization targets — investment in energy-saving measures, development of small photovoltaic (PV) systems, etc. — and changing foreign policy priorities after Babiš's premiership (2017-2021) and Zeman's presidency (2013-2023) ended.

Despite the Czech presidency's limited powers, Zeman's influence on foreign policy was significant, and he often used it to promote a positive image of Russia. In a March 2016 interview with China Global Television Network, Zeman

The Slovnaft Oil Refinery in Bratislava, Slovakia, annually refines 5.5 million tons of oil, 95% of which is imported from Russia. Slovakia is more dependent on Russian oil than any other country in the European Union. GETTY IMAGES

described Czech foreign policy as being based on "our own national interest" rather than succumbing to "pressure from the United States and the European Union." While previous presidents such as Václav Havel recognized Russia as a potential source of instability, Zeman often viewed Russia as an opportunity for renewed economic relations and a counterbalance to the West.

Zeman's support for Putin's Russia makes him a polarizing figure. In 2014, on the 25th anniversary of the Velvet Revolution — the peaceful end of Communist rule in Czechoslovakia, which also led to an amicable split of the country into the Czech Republic and Slovakia in 1993 — thousands protested, waving red cards and throwing eggs, one of which hit visiting German President Joachim Gauck. Protests against Zeman continued until 2021, with demonstrators calling for his resignation. And in April 2021, when Czech authorities concluded that the Russian military intelligence service GRU was responsible for an ammunition warehouse explosion in Vrbětice in 2014, Zeman controversially countered the military's conclusions. Pavel Fischer, chairman of the Czech Senate Committee on Foreign Affairs, Defence and Security, said at the time: "With his manipulative statements, Zeman already stands on Russia's side and has become its advocate."

With the crisis caused by the escalation of the Russian-Ukrainian war in 2022, the Czech government and the entire energy sector have been compelled to respond swiftly. In addition to addressing sharp increases in electricity and gas prices, the government has managed to cut imports of Russian gas by about 90%. Cooperation in the nuclear energy sector was already downgraded in 2021 when the Czech Republic canceled an agreement with Rosatom to build a new unit of the Dukovany Nuclear Power Station in response to Russia's involvement in the Vrbětice incident. Nevertheless, dependency on Russian crude oil will persist until at least 2025.

The Polish exception

Poland's historical relationship with Russia has been tumultuous, marked by centuries of conflict, wars and occupations. From the partition of Poland in the late 18th century by the Russian Empire to Soviet control during World War II (September 1939-June 1941) and much longer during the Cold War era, Poland has faced repeated attempts by Russia to exert dominance. These historical events have fostered deep-seated mistrust and animosity between the two countries, influencing their contemporary relations, including in the energy trade.

Together with the Baltic states, Poland has been the most critical of Russian aggression in Ukraine, dating to Russia's 2014 occupation of Crimea and parts of the Donbas. These geopolitical tensions have strained bilateral relations and contributed to Poland's efforts to reduce dependence on Russian energy imports. Additionally, Poland's alignment with Western allies, particularly NATO, has shaped its energy policies to align with broader European security interests.

Poland's reliance on Russian energy sources, particularly natural gas and oil, stems from geographical proximity and historical ties. Russia has been a major supplier of natural gas to Poland, with Gazprom supplying gas through pipelines like Yamal-Europe and Brotherhood. This dependence has raised concerns about energy security, given Russia's history of using energy as a political weapon, conspicuous from past disputes and supply disruptions. Poland's vulnerability to supply disruptions became evident during gas disputes between Russia and Ukraine, which affected transit supplies

to Poland. For example, in 2006 and 2009, Gazprom halted gas deliveries to Poland due to pricing disputes concerning Ukrainian transit pipelines, leading to shortages and economic disruptions. These incidents underscored the need for Poland to diversify its energy sources and reduce reliance on Russia.

Then-Polish Prime Minister Mateusz Morawiecki speaks at the Gaz-System natural gas plant near Warsaw in 2022, shortly after Russia's invasion of Ukraine changed Europe's energy security fundamentals. THE ASSOCIATED PRESS

As an EU member state, Poland's energy policies are influenced by EU regulations and initiatives aimed at promoting energy security, sustainability and competitiveness. Poland's efforts to diversify its energy mix align with the EU's Energy Union strategy, which seeks to strengthen energy resilience and reduce reliance on single suppliers. Poland has participated in EU-funded projects to develop cross-border energy infrastructure and promote renewable energy sources, contributing to broader European energy security goals. One key initiative is the construction of the Świnoujście LNG terminal, which lets Poland import LNG from global markets. Moreover, Poland has invested in interconnection projects with neighboring countries, such as the Baltic Pipe project with Denmark and Norway, to enhance regional energy cooperation and diversify supply sources.

For Poland, the war in Ukraine represents a major change in energy relations with Russia. As Magdalena Maj reported in 2023 for Friedrich Ebert Stiftung, Russian gas made up about 87% of all gas imported into Poland in 2021, including shipments to Germany via the Yamal pipeline. However, a year later, the quantity had dropped dramatically to 20%, and by the first quarter of 2023, Poland ceased importing Russian gas entirely. During this period, LNG and the Baltic Pipe were responsible for 85% of Poland's gas imports.

War and green targets: a complex intersection

The full-scale invasion of Ukraine served as a wake-up call for Europe, highlighting its heavy reliance on Russian gas and oil. Despite the urgency, some European governments had failed to sufficiently diversify their energy sources before the conflict. This was partly due to former German Chancellor Angela Merkel's policy of trying to economically integrate Russia into Europe. Consequently, Russia had the leverage to reduce or halt gas flow to certain countries, such as Poland, on multiple occasions over the past two decades.

At the EU level, delays in diversifying energy supply were influenced by divergent national foreign policy interests and varying perceptions of Russia among member states. While larger countries such as Germany and Poland managed to transition to more expensive alternatives after February 2022, smaller nations such as Hungary and Slovakia found themselves without appealing options. And while most EU governments sought new suppliers, Hungary's Orbán openly supported increased imports of Russian gas.

The escalation of the war prompted many EU countries, such as Germany, to abandon friendly policies toward Russia. Whereas Polish attitudes toward Russia remain negative to the extent that two-thirds of Poles want to increase sanctions on Russia, Hungary and Slovakia find themselves in a difficult position and remain reluctant to follow suit. This is compounded by Germany's decision to shut down its nuclear energy industry and push for sanctions on Russian nuclear fuel, affecting Hungary's plans for the Paks II NPP project.

Energy has long been central to Hungarian-Russian relations, with Orbán's government showing no inclination to change course. Gas imports play a crucial role in Hungary's relations with Russia. The Paks II NPP project symbolizes the close ties between Budapest and Moscow, although its implementation relies on technology and permissions from other countries such as France and Germany.

Hungary's multilevel ties with Russia distinguish it from neighboring countries, shaping its foreign policy differently. While similarities existed between Hungary's and Poland's domestic policy shifts, their foreign policies diverge. Not all foreign policy decisions align with energy and security policies, as demonstrated by Slovakia's gas diversification challenges and the omission of the nuclear industry from sanctions packages.

While the war in Ukraine has brought energy security to the top of the EU agenda, it has also highlighted the vulnerabilities of many countries in East Central Europe that used to rely on imports from Russia. The convergence between dependency on Russian energy and green targets, as defined in the EU Green Deal, represents a particular challenge for the economies of the Visegrád Group. This includes the

Heavy equipment is used to prepare for construction of the Paks II Nuclear Power Plant in Paks, Hungary. The plant is a collaborative effort between Hungary and Russian nuclear company Rosatom. AFP/GETTY IMAGES

Czech Republic and Poland, which managed to cut imports from Russia but remain highly fossil fuel-oriented, and some regions rely on coal mining for employment.

According to Tobias Riepl and Zuzana Zavarská of the Vienna Institute for International Economic Studies, the EU Green Deal, which is intended to guide the EU toward carbon emission neutrality, has faced skepticism in the Visegrád countries. Data from REN21 and World Energy Statistics show that Hungary has seen a decline in its renewable energy share, currently at about 12%. In the Czech Republic, the renewable energy share of the electricity mix has been relatively stagnant, at 14% in 2024, with most of that coming from biomass and hydropower. Poland has been making efforts to increase its renewable energy capacity, particularly in wind power, and renewables have reached about 17% of its electricity production. Slovakia has seen a moderate increase in renewable energy, to about 22%, with a significant portion of its renewable electricity coming from hydropower.

Conclusion

The complexities of energy relations within the Visegrád Group — particularly regarding the factors of long-term dependency on Russia and the EU's green targets — underscore both the challenges and the divergent approaches among the four states. While historical ties and economic considerations have shaped energy cooperation with Russia, recent geopolitical events have prompted shifts in attitudes and policies.

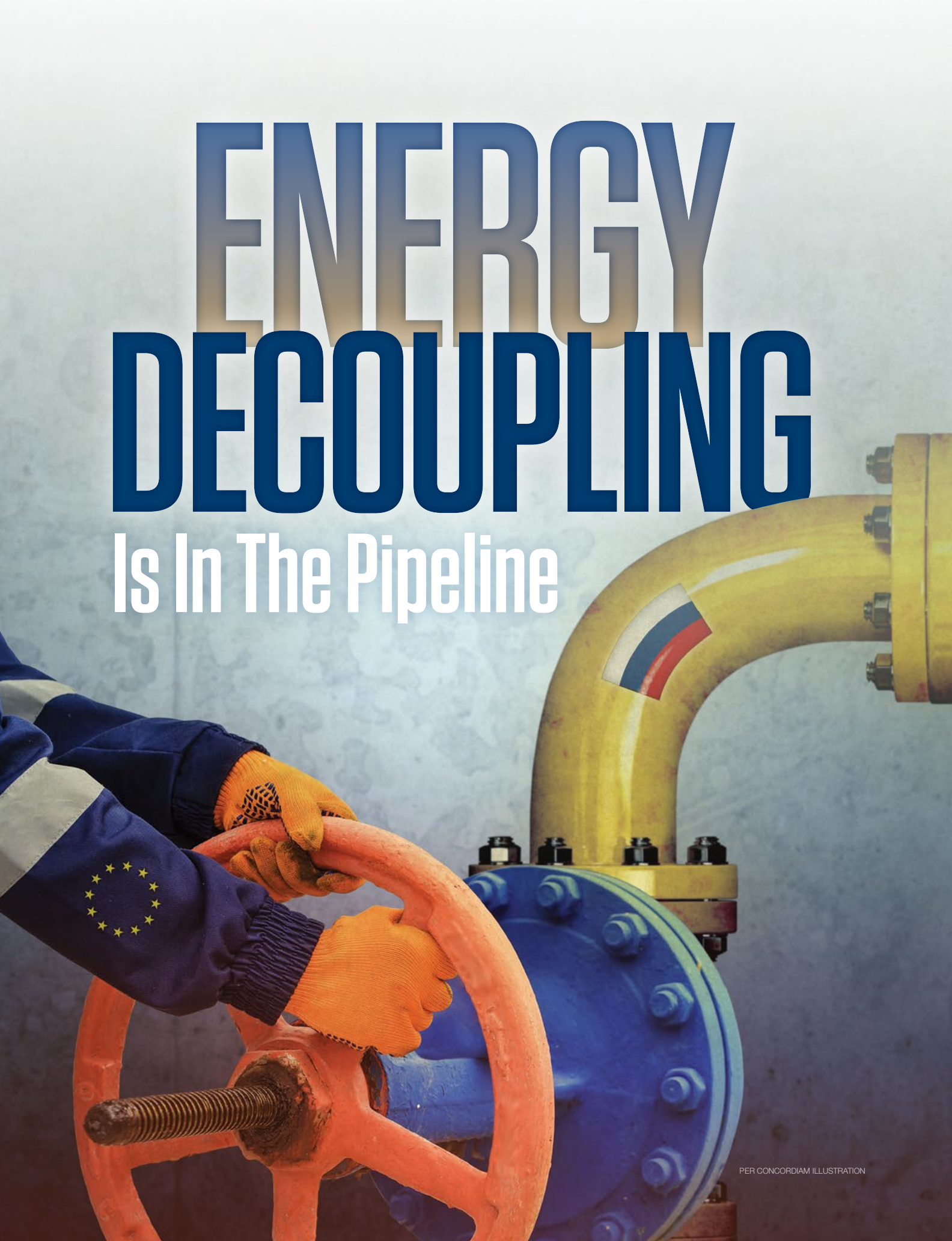
Countries such as Hungary and Slovakia have maintained significant reliance on Russian energy, despite calls for diversification and EU sanctions targeting many sectors. This reliance has not only strained relations within the Visegrád Group but also raised concerns about energy security and geopolitical vulnerabilities. Poland, however, has taken proactive measures to reduce dependence on Russian imports, investing in LNG terminals and interconnection projects to enhance energy resilience.

The intersection of energy dependency and green targets presents a unique challenge for the region, highlighting the need for balanced strategies that prioritize both sustainability and security. While progress has been made in improving energy efficiency and increasing renewable energy capacity, obstacles remain, including dependence on fossil fuels and concerns about social implications. In some Central and Eastern European countries it also includes lower starting points that created path dependencies, limited (although growing) social recognition of the climate crisis, and concerns about social fallout due to employment in the coal and automotive sectors.

As the Visegrád countries navigate these challenges, cooperation within the EU and concerted efforts to diversify energy sources will be essential for enhancing resilience and achieving climate neutrality. □

ENERGY DECOUPLING

Is In The Pipeline



PER CONCORDIAM ILLUSTRATION

Europe Works to Sever Reliance on Russian Gas

By **Martin Vladimirov**, Center for the Study of Democracy

Russia's invasion of Ukraine exposed Europe's vulnerabilities in energy and climate security. The war exacerbated the crisis caused by the gas supply deficit on global markets and highlighted the excessive reliance of many European Union member states on Russian fossil fuel imports. Europe must improve its energy sector governance to decouple from the Kremlin's malign economic and political influence.

European countries have been forced to rapidly replace Russian gas at a time when there are limited alternative supply options (mostly liquefied natural gas, or LNG, from the United States and increased pipeline imports from Algeria and Norway) sold on an overheated spot market. Although key natural gas consumers such as Germany and Italy have accelerated efforts to diversify and move fully away from Russian gas, for many other countries — mostly in Central and Eastern Europe (CEE) — natural gas import risks have remained high as dependence on Russia persists.

The flow of natural gas through TurkStream, a pipeline that delivers Russian gas to Greece, Hungary and the Western Balkans, remains unchanged in comparison with prewar levels, making it the largest source of Russian gas exports to Europe. Since its commissioning on January 1, 2021, until March 2024, TurkStream had transported 46 billion cubic meters (bcm) of Russian natural gas to Bosnia and Herzegovina, Greece, Hungary, North Macedonia and Serbia. At the same time, countries such as Austria, Slovakia and, indirectly, the Czech Republic continued buying Russian pipeline gas through Ukraine and have adhered to Russian state-controlled gas monopoly Gazprom's proposed ruble-based payment scheme since April 2022 (Figures 1 and 2).

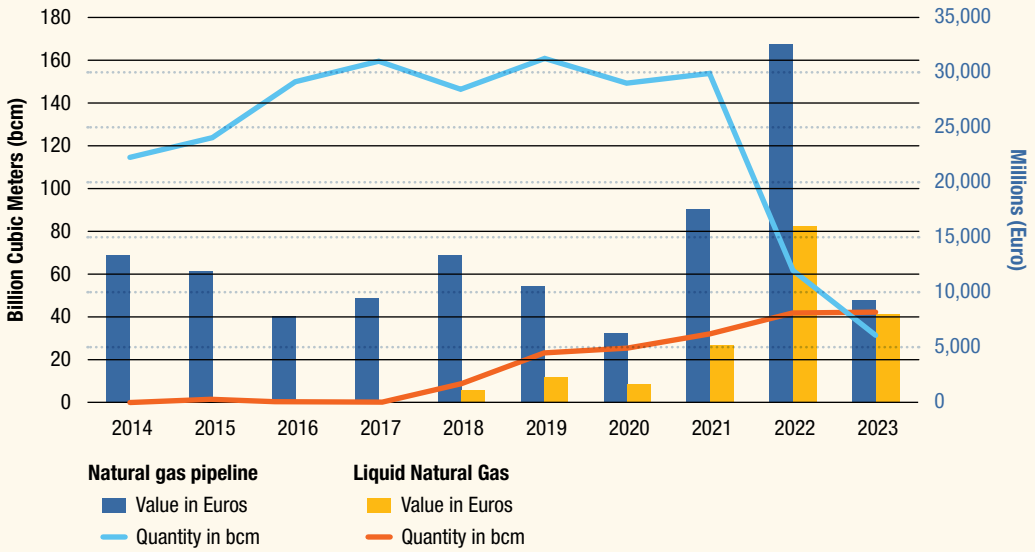
In 2022, Russian pipeline exports to Europe fell by 62% compared with 2021, but Russia received 13.8 billion euros more in revenues. In addition, Russia has been steadily increasing its LNG exports to the EU by investing heavily in LNG export infrastructure. In 2022, Russian LNG sales had the largest year-on-year increase (30%) in volume, leading to a 209% increase in revenues (about 16 billion euros) as a result of high prices in Europe.

In 2023, the phaseout of Russian gas imports to Europe finally started biting at the Kremlin's revenues, which fell by close to two-thirds. Yet, Russia still sold more than 73 bcm of LNG and pipeline gas, raking in 17.3 billion euros. For all the hype about Europe successfully cutting its gas dependence, Russia still supplies 15% of total EU gas imports — closely trailing the U.S. (19%) and slightly ahead of North Africa (14%).

Among the EU countries that have increased Russian LNG imports are Belgium, Greece, Italy, the Netherlands, Portugal and Spain. Some of the LNG is not consumed in the country of arrival but is shipped ahead to other markets, including those that suffered a direct Gazprom supply cut in 2022. The goal is to make the ultimate ownership of the natural gas untraceable (Figure 3).

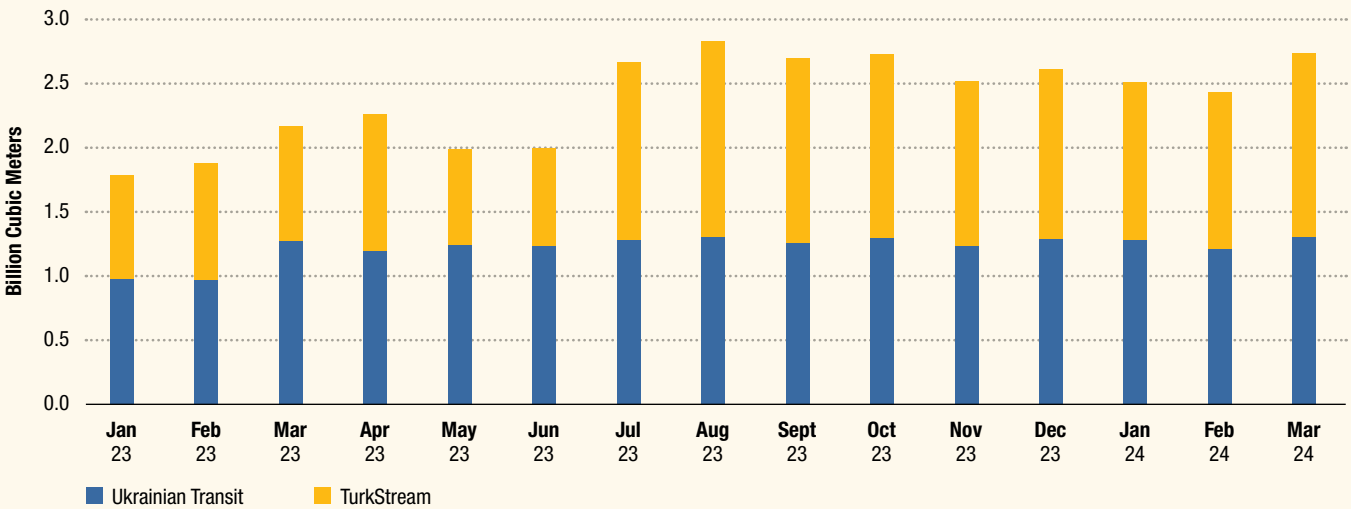
A construction worker tends to an extension of the TurkStream natural gas pipeline in Letnitsa, Bulgaria, in 2020. The pipeline let Russian energy giant Gazprom bypass Ukraine and send gas through Bulgaria to Bosnia and Herzegovina, Hungary and Serbia. REUTERS

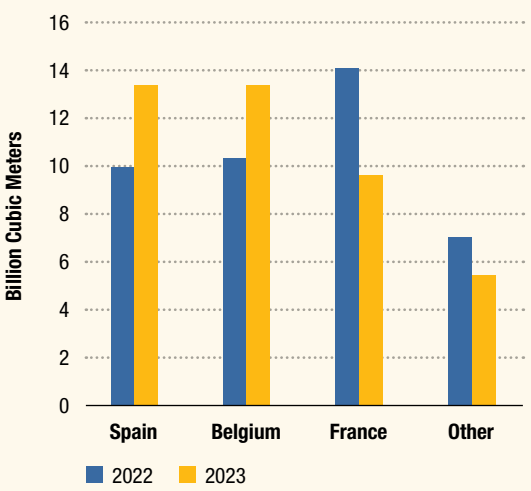
Figure 1: Russian natural gas exports to Europe (total volume and value)



Source: Center for the Study of Democracy based on Eurostat data

Figure 2: Russian pipeline (top) and LNG exports to Europe (bottom)





German regulators took control of Gazprom Germania to secure Germany's energy supply and critical infrastructure in the wake of Russia's invasion of Ukraine. AFP/GETTY IMAGES

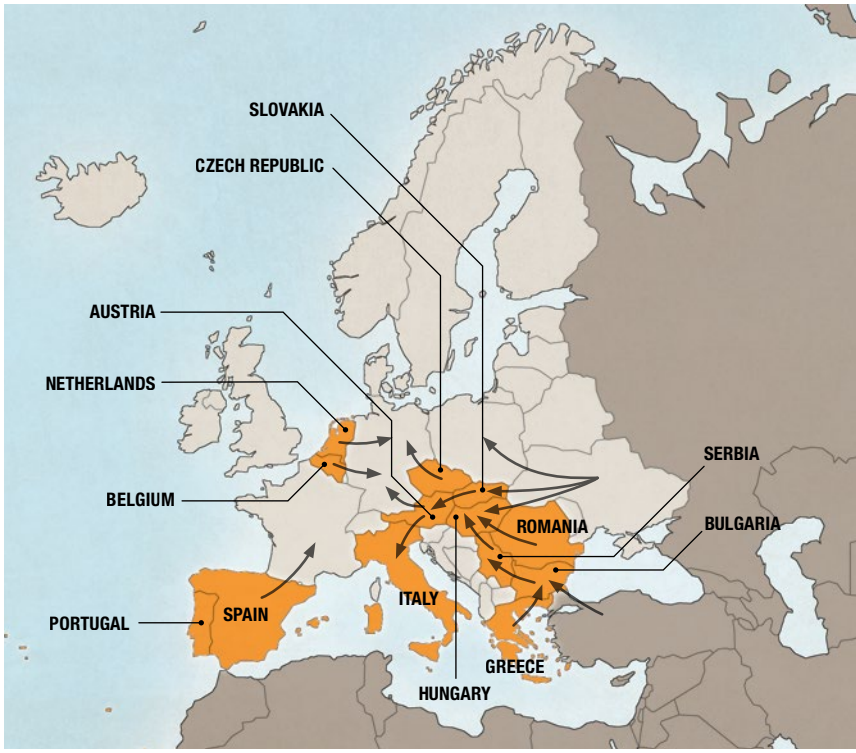
Source: Center for the Study of Democracy, based on European Network of Transmission System Operators for Gas data

Three examples clearly stand out. Bulgaria and Greece have been buying Russian LNG since 2022, although the former stopped buying Russian pipeline gas directly in April 2022, and the latter cut pipeline gas imports by 20%. Greek traders increased Russian LNG imports by 400% in 2023, widening the overall Greek dependence on Russian natural gas to 47%. Much of this Russian LNG was indirectly imported by Bulgaria, though initially destined for Greek companies that have long-term agreements with Gazprom.

Similarly, Belgium has significantly increased its LNG imports since February 2022 to meet not only its own demand, but also that of Germany, the EU's largest economy. In 2023, Belgium's purchases of Russian LNG jumped by 30% to about 13.4 bcm, the bulk of which has been reexported to Germany, which receives around a quarter of its pipeline imports from Belgium. France and the Netherlands, which jointly imported another 11.6 bcm of Russian LNG, make up another 25% of German gas imports via pipeline.

Finally, Portugal and Spain became the biggest re-exporters of Russian LNG in Europe in 2023, buying more than 14 bcm and sending more than 50% of that volume east to France, Italy, Switzerland and others. Spain has become a hub for shipments of Russian LNG, enabled by trading companies that have had close ties to Russia, including MET Group and Gunvor.

Figure 3: Indirect Russian gas flows



Source: Center for the Study of Democracy

Exporting gas via intermediaries has become a strategic Russian objective. The Kremlin aims to not only obfuscate ownership of the natural gas entering the European market, but also to preempt a potential full EU ban on such imports. The European Commission has advised member states to stop buying Russian gas by 2027, in line with the end of the long-term supply contracts of most of Gazprom's European clients. Yet, this diversification effort could remain only on paper if Russian gas exporters can reroute their sales and expand their network of third-party companies ready to benefit from the premium profits they get for trading cheaper Russian gas.

Still in the Russian Gas Grip

In the absence of sanctions on gas, Russian supply continues to flow through the European pipeline system, albeit at lower rates. CEE countries have remained largely dependent on Russian gas imports. The main recipients of Russian pipeline gas have been Austria, Bosnia and Herzegovina, Croatia, Greece, Hungary, Italy, Serbia and Slovakia. Slovakia, in particular, has become a distribution hub for Russian gas in Central Europe, acting as a transit country from the Ukrainian gas system for onward flows to Austria, the Czech Republic, Germany, Hungary and Italy. In fact, Austria increased its dependence on Russian gas to 98% (up from 80% before the war), reversing the initial decision from the fall of 2022 to reduce gas imports from Russia. The major Austrian oil company, OMV, has a long-term supply contract with Gazprom that ends in 2040. However, that deal is now in doubt. Gazprom stopped supplies to OMV on November 16, 2024, when the Vienna-based utility said it would stop gas payments after winning an arbitration award connected to a previous price dispute. The company has discussed alternative supply options — including buying gas from Norway and from Azerbaijan (via Turkey) — but a structural change in Austria's gas policy has been constantly delayed.

Hungary followed by expanding its natural gas imports from Gazprom under a 15-year supply contract signed in 2021 for 4.5 bcm/year. In 2023, Hungary expanded imports from Russia by at least another 1.5 bcm, with 75% of the volume transported via TurkStream (Figure 4).

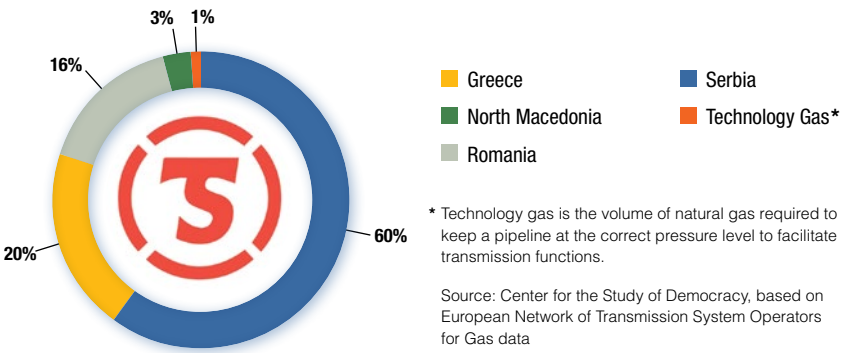
In Southeast Europe, almost three years after the Russian invasion of Ukraine, Gazprom is still king albeit with diminished power. The Russian company has effectively utilized TurkStream and legacy contractual arrangements for the booking of capacity on the Trans-Balkan Pipeline until 2030 to reduce the entry of gas from alternative sources.

Serbia and Bosnia and Herzegovina (buying a total of about 3.1 bcm/year) receive 100% of their natural gas needs from Russia via TurkStream. In fact, 61% of transit volumes through the European extension of the pipeline are destined for the Western Balkans and Hungary. Another 20%, or about 2.7 bcm in 2023, is shipped to Greece and 16% to Romania, covering most of the natural gas consumption of Moldova and some 10% of Romania's own gas supply. Additionally, less than 3% of the gas is delivered to North Macedonia.

New Outlets for Russian Gas Exports to Europe

As a result of the January 1, 2025, halt of Russian gas transit through Ukraine, Moscow could try to ship some of that roughly 14.5 bcm/year volume via TurkStream. Under the transit agreement between Gazprom and the Bulgarian gas transmission system operator, Bulgartransgaz, the Russian company can book up to 90% of the entry point to the Bulgarian gas network from TurkStream at Strandzha-2. Currently, Gazprom has been using some 75% of the available capacity, which means that it can increase distribution through TurkStream by 2.5 bcm/year.

Figure 4: Where the TurkStream gas goes



* Technology gas is the volume of natural gas required to keep a pipeline at the correct pressure level to facilitate transmission functions.

Source: Center for the Study of Democracy, based on European Network of Transmission System Operators for Gas data

The other rerouting option for Gazprom is to take advantage of the agreement signed between Bulgartransgaz and the Turkish state-owned gas monopoly, Botas, in January 2023, allowing the latter to use the entry capacity at Strandzha-1 (the old Trans-Balkan Pipeline cross-border point between Bulgaria and Turkey) in reverse mode. The deal allows the Turkish transmission system to transfer up to 1.9 bcm/year of gas to Bulgaria and opens access for Bulgargaz, the largest state-owned gas supplier in Bulgaria, to Turkish LNG terminals and storage facilities. If Bulgargaz does not use the booked capacity on the Bulgarian entry point for the import of gas from Turkey, the tripartite contract in effect allows Botas to sell some 3.65 bcm/year of gas to the Bulgarian and broader SEE markets. Since according to the Turkish gas law, natural gas entering Turkey automatically is owned by Botas, the Turkish company could resell surplus Russian gas volumes as nominally Turkish gas to the SEE market. This is consistent with announcements in late 2023 by senior officials in the Russian and Turkish governments that Gazprom and Botas are working on a concept for a natural gas hub in Turkey that will serve to replace Gazprom's lost sales to Europe.

Considering that Gazprom uses only two-thirds of the available capacity of the two pipelines linking Russia and Turkey directly via the Black Sea — Blue Stream and TurkStream — the Russian firm could potentially expand sales to Turkey by 8 to 10 bcm/year. To resell these volumes on to the European market, Botas has been considering the use of the cross-border points with Bulgaria, where it can export roughly 6 bcm/year, and the Trans-Anatolian Pipeline (TANAP) reaching the border with Greece, connecting to the Trans Adriatic Pipeline (TAP) at the Kipoi border point, with another 2.5 bcm/year of available capacity. In a sign that the rerouting strategy is underway, Botas signed an agreement with the Hungarian company MVM to sell about 300 million cubic meters per year (mcm/year).

Ending Russian Pipeline Imports Post 2024

The SEE countries should be, and are, able to eliminate their dependence on Russian fossil fuel imports as a matter of national security. Doing so is the most direct path to halt the flow of funds from SEE to Russia's war effort, and to counter its malign economic and political influence activities across the region. Hence, Russian natural gas transit through Ukraine having ended at the end of 2024, SEE countries have the unique opportunity to fully phase out Russian pipeline gas imports into Europe, which would require that Bulgaria, the entry point of the European extension of TurkStream, stops the Russian gas transit after the end of the winter heating season on May 1, 2025.

As a result, the SEE region will lose access to roughly half of its existing natural gas supply (Figure 5). Yet, there are no major security or supply risks from cutting Russian pipeline imports with the exception of Bosnia and Herzegovina, which receives 100% of its gas from Russia via the Serbian section of TurkStream, and which does not currently have easy access to an alternative gas supply (Figure 5).

The rest of the region will be able to leverage the significantly improved regional gas connectivity over the past seven years to fully replace reduced Russian gas volumes. Alternative gas delivery routes have the capacity to bring 3.5 times more gas than current Russian deliveries. This is possible because Bulgaria, Greece, Hungary, Romania and Serbia completed several strategic interconnector projects that have allowed reverse-flow gas deliveries on most SEE border points. Even more importantly, SEE countries have accelerated work on the now-empty Trans-Balkan Pipeline, which brought Russian gas to the SEE region via Ukraine until TurkStream was launched in 2021. The Trans-Balkan network could be used to ship LNG delivered to Greek and (in theory) Turkish regasification terminals to Central Europe, Moldova and Ukraine.

The launch of the Alexandroupolis Floating Storage and Regasification Unit (FSRU), which began commercial operations on October 1, 2024, will bring 5.5 bcm/year of additional LNG import capacity to the region. This means that Greece, which has another regasification plant in Revithoussa near Athens, would be able to import 12.3 bcm/year of gas from the global market, or around 79% of what is currently imported from Russia to the entire SEE region. Greece can, hence, fully replace its own Russian gas supplies, currently at close to 2.5 bcm/year. Greece also has a long-term supply

Figure 5: Southeast Europe's dependence on Russian gas and available alternative supply in case of a TurkStream shutdown (million cubic meters per year)

Country	2023 Demand (mcm)	Russian Gas Supply (mcm)	% Russian Gas Dependence	Alternative Supply Routes (mcm)	% Coverage of Russian Supply by Alternatives	Alternative Supply Routes
Bulgaria*	2,544	1,492	59%	7,800	523%	• **From Greece:** Booked capacity at Alexandroupolis FSRU 1,000 mcm/yr and ICGB expansion to 5,000 mcm/yr • **From Turkey:** Booked LNG capacity 1,800 mcm/yr
Greece	5,211	2,449	47%	13,300	543%	• **From domestic LNG:** 4,500 mcm/yr of capacity at Alexandroupolis FSRU and 6,800 mcm/yr at Revithoussa • **From Turkey:** 2,000 mcm/yr available capacity at TAP
Croatia	2,536	1,395	55%	5,782	415%	• **From domestic LNG:** Krk LNG regasification plant 2,899 mcm/yr • **From Hungary:** Dravaszerdahely 2,883 mcm/yr
Hungary	8,499	5,000	59%	7,900	158%	• **From Croatia:** Krk LNG regasification plant 1,800 mcm/yr • **From Romania:** 1,000 mcm/yr • **From Austria:** 4,400 mcm/yr
Romania	9,545	1,479	15%	7,885	533%	• **From Bulgaria:** Ruse 985 mcm/yr and Kardam 6,689 mcm/yr
Moldova (w/o Transnistria)	657	0	0%	2,085	317%	• **From Romania:** Ungheni 2,080 mcm/yr
North Macedonia	350	350	100%	1,241	355%	• **From Bulgaria:** Kyustendil 1,241 mcm/yr
Serbia	3,057	2,500	82%	6,800	272%	• **From Bulgaria:** Kulata 2,007 mcm/yr • **From Hungary:** Szeged 4,800 mcm/yr
BiH	254	254	100%	1,496	589%	• **From Croatia:** 1,496 mcm/yr (planned)
Total	***32,653***	***14,919***	***46%***	***54,289***	***364%***	

Source: Center for the Study of Democracy. *Bulgaria imports only around 300 million cubic meters of Russian gas directly via TurkStream. However, there is evidence that Bulgargaz, Bulgaria's biggest wholesale supplier, is buying about 1.1 bcm/yr of gas from Greek traders DEPA and Mytilineos, which both have long-term contracts with Gazprom, at the TurkStream entry point Strandzha-2. This import volume corresponds to about 80% of total Greek gas exports.

A Gazprom employee works in a control room where the Russian company's network is monitored. Gazprom is the largest extractor of natural gas in the world.
AFP/GETTY IMAGES

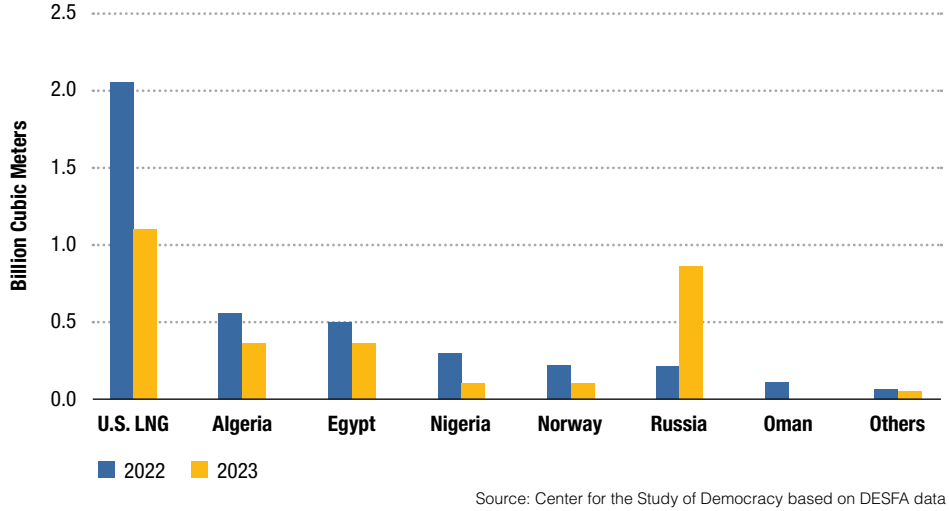
contract with SOCAR for 1 bcm/year delivered from Turkey via the TANAP-TAP connection at the Kipoi entry point. There, Greece could potentially import another 2 bcm/year of Azeri gas or LNG delivered at Turkish terminals.

The Greek LNG regasification facilities can also fully replace Russian gas imports to Bulgaria. Bulgargaz already has 1 bcm/year of booked capacity at Alexandroupolis, which can be shipped via the Interconnector Greece-Bulgaria (ICGB), which is also delivering 1 bcm/year of contracted Azeri pipeline gas to the Bulgarian market. The interconnector's total capacity is currently 3 bcm/year but will likely increase to 5 bcm/year in 2025, allowing for the redirecting of Alexandroupolis LNG deliveries to Bulgaria, Moldova, Romania and, potentially, to Hungary and Ukraine.

The latter will depend on how quickly the expansion of the reverse-flow capacities on the Trans-Balkan pipeline (expected to be doubled by the end of 2025) can be completed, bringing gas to Moldova and Ukraine, and also the interconnection point between Romania and Hungary. Bulgaria can also use the standing agreement with Botas until 2035 to import up to 1.9 bcm/year of LNG via Turkish terminals (Figure 6).

Romania, which is the biggest natural gas consumer in the region, satisfies more than 75% of its own demand with domestic production. However, it still bought around 1.5 bcm of Russian gas in 2023 via TurkStream. Although the Moldovan government in Chisinau said that it has stopped direct imports of Russian gas, TurkStream transit volumes to Romania indicate that this may not be the case, and that Moldova keeps buying Russian gas via intermediaries. In the medium term, Romania and Moldova could potentially fully phase out their dependence on Russian gas when the offshore Neptun gas field and its reserves of up to 100 bcm begin

Figure 6: Sources of imports of LNG at the Revithoussa terminal



Source: Center for the Study of Democracy based on DESFA data

commercial gas extraction in 2027. Neptun will produce about 10 bcm/year, making Romania the largest EU gas producer and potentially a major exporter to Austria and Hungary via the planned Bulgaria-Romania-Hungary-Austria (BRUA) pipeline. The success of the project will depend on funding the key Podisor-Recas transmission link, which will bring the gas from the Black Sea to the Hungarian border. Until then, Romania and Moldova could replace Russian gas with more LNG imports from Greek and Turkish terminals.

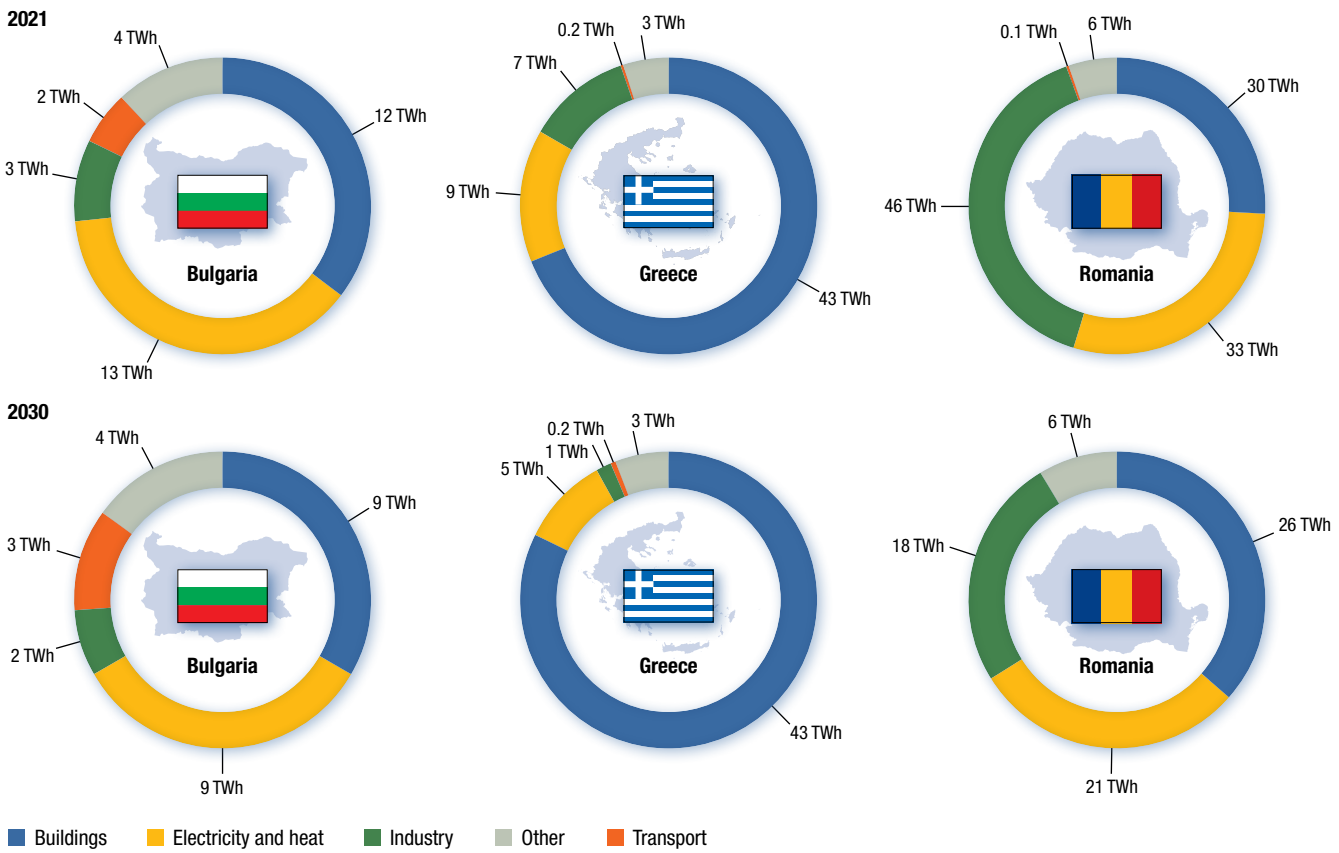
The most vulnerable countries to the halt of TurkStream transit through Bulgaria are in the Western Balkans. While Serbia can cover 25% of its gas needs from domestic production and has access to supply from Hungary, and by extension from Western Europe via the Austrian Baumgarten gas hub, Bosnia and North Macedonia do not yet have an alternative supply route. The Krk LNG regasification terminal will play a key role in solving the last and possibly most complicated piece of the new gas supply-security puzzle — replacing Russian gas supply in Hungary. Gazprom sold about 5 bcm to Hungary in 2023, more than 75% via TurkStream. Phasing out that supply will require LNG imports at the Croatian island of Krk in the Adriatic Sea, which has only 2.9 bcm/year of regasification capacity, and would likely be used to cover the 1.4 bcm of Russian gas that Croatia buys. The rest could potentially go to Bosnia and Hungary, but this would not be enough to cover the shortfall.

Phasing Out Natural Gas

Implementing ambitious decarbonization policies to reduce natural gas demand can substantially ease the phaseout of Russian gas in SEE. Promoting energy efficiency and electrification across different sectors, alongside encouraging biomass co-firing in district heating and for high-temperature industrial processes such as chemical production, could effectively mitigate the security risks of natural gas imports. An accelerated gas phaseout strategy could reduce gas demand by one-third across the region by 2030. The potential for reduced demand varies significantly among countries because of the differing roles of natural gas in their respective energy mixes.

Maximizing the potential to reduce natural gas consumption could transform Romania, for example, into a net exporter without requiring additional investments in gas production. For Bulgaria and Greece, while lowering natural gas demand may not eliminate import dependence, it would significantly reduce import volume. This reduction would greatly facilitate supply diversification without the need for additional infrastructure investments or the initiation of new long-term supply contracts. Signing such deals is challenging given the current tight global market, with fierce competition from larger consumers in Europe such as Germany and Italy, as well as from China. Therefore, SEE countries seeking new supply contracts may face difficulties in securing favorable pricing offers (Figure 7).

Figure 7: Natural gas demand by sector in Bulgaria, Greece and Romania in a scenario for accelerated gas phaseout, by terawatt hours (TWh)



Source: Center for the Study of Democracy based on data from Eurostat, Wuppertal Institute, TEP Energy, Artelys

Power Sector

The pivotal factor determining the success of phasing out gas will be whether regional governments decide to build gas-fired power plants and how fast these plants would be replaced in the future. Greece is moving forward with five new gas-fired power plants that will collectively exceed 4 gigawatts in capacity and are scheduled to begin operations by 2026. Meanwhile, Romania has two active projects supported by EU financing. In Bulgaria, an initial plan to construct a gas-fired generation facility was scrapped. However, the risk of a policy reversal remains significant given the volatility in the national energy strategy.

Relying on natural gas as a transitional fuel to decarbonize the power sector is a short-sighted strategy that will lead to higher costs and stranded assets, along with increased energy and climate-security risks. The recent surge in power tariffs in Europe is largely attributed to soaring natural gas prices and inadequate low-carbon electricity sources. Expediting decarbonization necessitates a stronger focus on innovative technologies such as renewables, grid modernization and battery storage. These efforts should be prioritized post-2030.

Industry

The energy transition debate in Southeast Europe remains painfully shortsighted and ignores the critical issue of industrial decarbonization. The region requires a deep industrial transformation to secure its economic competitiveness. The low energy and material efficiency of national industries offers huge potential in terms of energy efficiency measures and for low-hanging-fruit innovation. Such measures can deliver considerable reductions in gas demand by 2030 and contribute to improving national energy and climate security. The surge in natural gas prices has already introduced a strong price incentive for industry players to invest in energy efficiency, and fuel and technology switching, which would contribute to significant gas savings across the region. Yet, more needs to be done. Instead, regional governments with short-term policy agendas chose to splash helicopter money at the sector through lavish energy subsidies without conditions.

Phasing natural gas out of industry requires a complex approach adapted to the different ways gas is used and with particular focus on the different temperatures required for various industrial processes. Typically, industrial heat demand is associated with high-temperature processes — greater than 1,000 degrees Celsius, which electrification is still unable to provide — such as cement and virgin steel production. However, direct electrification solutions are already competitive in low- and medium-temperature processes. The use of natural gas in these processes is inefficient and wastes the fuel's potential. For low-temperature processes, other energy efficiency measures, including better insulation of industrial buildings and more efficient waste heat recovery also offer a strong potential for reducing overall energy demand and gas demand in particular. The deep decarbonization of industry requires a structural shift in all industrial production.

Buildings

The buildings category presents the greatest opportunity to reduce Southeast Europe's natural gas demand by 2030, accounting for half of the total estimated gas savings. To fully realize this potential and achieve deep decarbonization, a comprehensive policy strategy that focuses on electrification, energy efficiency and addressing energy-poverty risks is essential.

Natural gas has seen significant uptake in the buildings category of Southeast Europe, particularly in Romania, where individual gas boilers have replaced district heating and biomass, making natural gas the dominant heating energy source. In contrast, Greece and Bulgaria are motivated to phase out natural gas in buildings because of high prices. Greece has a lower dependence on natural gas for heating, with less than 10% of demand met by gas, while Bulgaria has only 2.5% of households connected to the gas grid.

The buildings category in Southeast Europe suffers from poor energy efficiency because of an aging building stock that falls short of European energy performance standards. Overcoming these barriers could potentially reduce energy demand in the buildings category by 9% by 2030 compared with 2018 levels, leading to a 56% decrease in natural gas consumption within the sector, alongside increased electrification efforts.

Policy Action for Gas Phaseout and Supply Security

The EU should accelerate the implementation of REPowerEU targets by prioritizing the complete phaseout of Russian oil and gas supplies to Europe. By providing exceptions to the oil embargo and closing its eyes to increasing Russian LNG imports, the EU allows individual member states to profit from their special relationships with Russia, undermining European unity. The EU has a political obligation to accept a possible surge in energy prices and persuade member states to stop buying Russian gas even if this means short-term economic pain. To secure a 100% Russian gas phaseout in 2025, European governments would have to undertake a series of short- and long-term measures that overcome the congestion and contractual risks linked to the halt of TurkStream:

Improving Supply Security

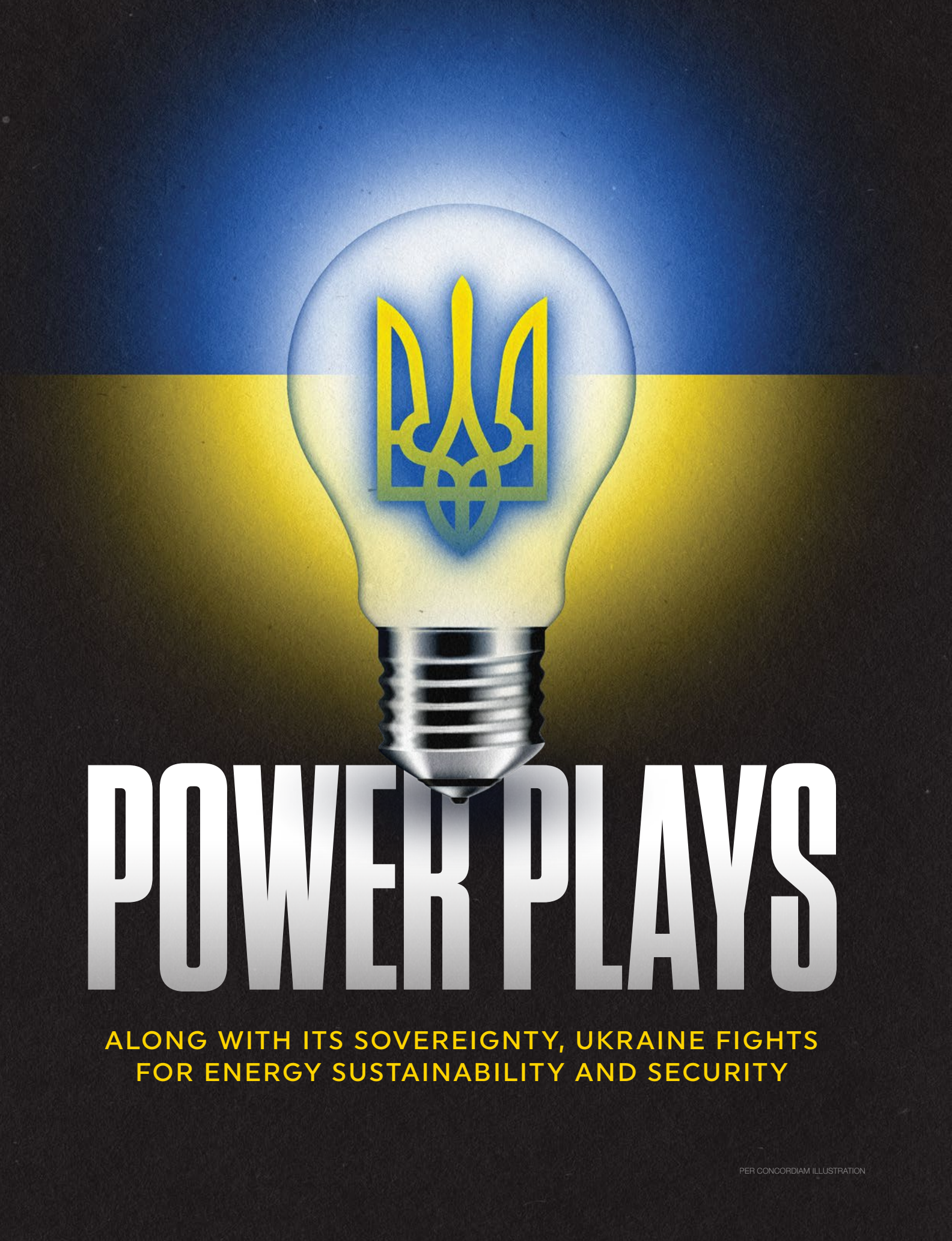
- The EU should expand the scope of sanctions to include natural gas. Blocking Russian LNG exports to Europe is unlikely to hurt consumers as most of that gas goes to markets with many alternative suppliers (e.g., Belgium, France, Italy, Portugal, Spain), but stopping pipeline gas imports from Russia would be more challenging, especially when we consider the supply options of the Western Balkans and, to an extent, of Hungary. A sanctions regime with targeted derogations for the most vulnerable countries would be appropriate. Such exemptions should, however, be tied to a clear timeline for the phaseout of long-term natural gas contracts and specific steps for lowering overall demand.
- Full decoupling from Russia will not be possible without

targeting the state capture networks that enable strategic partnerships between Russian and European energy companies. The EU's economic security requires sophisticated mechanisms for screening and halting Russian strategic investments in Europe — both overt and covert — linked to state-owned companies and oligarchs close to the Kremlin. Such screening needs to be complemented by measures to ensure intra-EU corporate-ownership transparency and strengthen the European antimoney-laundering infrastructure, as well as reducing the Kremlin's hidden economic footprint in Europe.

- European countries should accelerate ending all long-term contracts with Gazprom. Several gas trading companies still have such deals with the Russian company, ending at the conclusion of 2025 (Serbia's Srbijagas), in 2036 (Hungary's MOL) and 2040 (Austria's OMV). The simultaneous end of gas transit through Ukraine and through TurkStream should allow Gazprom's clients to suspend or renegotiate their agreements.
- Ensure that Russia does not circumvent sanctions on Gazprom by passing its gas exports via intermediaries or by supplying the SEE region with LNG. There is a strong indication that Botas in Turkey is acting in cooperation with SOCAR as fronts for increased Russian gas sales to the SEE region.
- Complete gas diversification strategies by 2025-2026 by finalizing projects such as regional gas interconnectors, storage facilities and LNG regasification plants. It is crucial that Bulgaria accelerates the expansion of the Chiren underground gas storage facility. Greece does not have a gas storage facility, and for the regional market to function effectively, the country would need to either build one or use facilities in Bulgaria and Italy to manage the huge uptake of alternative supply. Greece is also planning a new LNG regasification facility near Kavala, and U.S. investors are mulling an LNG plant in Albania to bring U.S. supply directly to the Western Balkans.
- Gas imports at the LNG regasification terminals in Greece and Turkey will play a crucial role in maintaining security of supply. It is imperative that Bulgaria, Greece and Romania sign solidarity agreements, following the model of other EU members, to optimize the allocation of the limited alternative gas supplies entering the region. Without a nondiscriminatory interconnection agreement between Turkey and Bulgaria that opens the Turkish market to foreign gas traders, Turkey's potential as a hub for secure and competitive gas supply would not be fulfilled.
- Avoid signing LNG supply agreements that last beyond five years, which is the standard duration in most of Europe. Priority should be given to new floating regasification terminals leased on a temporary basis rather than fixed facilities.
- The gas supply crisis should not be a justification to replace dependence on one gas supplier with another. Where possible, SEE countries should friendshore supply agreements, ensuring that they are based on beneficial commercial relationships that will facilitate the entry of constructive capital into the region.
- SEE countries should ensure physical and contractual reversibility of existing interconnection pipelines, including the Trans-Balkan transit pipeline, which Gazprom no longer uses. The pipeline should be able to transport expected surplus gas volumes of around 10 bcm in the next five years to Hungary, Moldova, Slovakia and Ukraine via the planned Vertical Gas Corridor, which would require additional expansion on the Greece-Bulgaria section and on the Bulgaria-Romania border.
- A common EU gas-purchasing mechanism should be introduced to secure stocks and achieve economies of scale in mobilizing alternative gas supplies. Russian and Azeri gas pipeline prices are cheaper than LNG imports on the spot market, which has been dissuading SEE gas companies from seeking alternatives. Attracting competitive supply at affordable prices would be more feasible if several SEE companies sign a joint contract with a major LNG supplier.

Gas Phaseout and Decarbonization

- The only sustainable long-term strategy for reducing security-of-supply risks is to phase out the use of natural gas. The untapped potential for energy efficiency remains a key supply-security risk. Cutting overall gas consumption will mean fewer fossil fuel imports, and therefore greater energy independence. SEE countries should undergo an accelerated energy efficiency investment strategy, focusing specifically on energy-poor households and deep renovation programs to reduce consumption faster than the current 2030 targets.
- Reduce the share of natural gas in the energy mix by replacing it with locally sourced renewable energy. This would not only limit exposure to Russian imports and geopolitical risks but also to the inherent price volatility of fossil fuels.
- Phasing out natural gas is possible if the region increases efforts to:
  - **Replace natural gas** in heating with a heat-pump rollout strategy and electrification.
  - **Accelerate offshore wind and power-storage projects** to replace natural gas power plants to cover peak demand.
  - **Avoid a natural gas lock-in** by rejecting any new EU-financed natural gas transmission and gas-fired power plant projects unless they contribute to reducing short-term natural gas supply risks. Optimizing the use of existing gas infrastructure could limit the need for major expansion.
  - **Avoid adopting blue hydrogen** as an alternative based on the increased use of natural gas, as well as the unnecessary construction of new or expansion of existing gas transmission networks repurposed for hydrogen transportation.
- A complete gas phaseout won't be possible without major industrial decarbonization measures directed toward the electrification of production, especially in the most energy-intensive sectors, such as mining, metallurgy and cement. □



POWER PLAYS

ALONG WITH ITS SOVEREIGNTY, UKRAINE FIGHTS FOR ENERGY SUSTAINABILITY AND SECURITY

PER CONCORDIAM ILLUSTRATION

By **Dr. Natalia Slobodian**, research fellow, Canterbury Christ Church University,
and **Dr. Svitlana Andrushchenko**, director, Recovery and Reform Support Team, Ukrainian Ministry of Energy

Russia's ongoing war against Ukraine has widespread implications for the global energy transition. It has highlighted both the vulnerability of energy infrastructure and the importance of transitioning toward sustainable energy sources. It has also emphasized the necessity of international cooperation in addressing challenges and managing risks in the energy sector. Such cooperation and coordinated efforts are vital for emergency responses as well as containing external threats to energy security.

Ukraine's experience can provide valuable insights into sustainable approaches for the recovery and reconstruction of the energy sector. By prioritizing renewable sources and enhancing efficiency, countries can lessen their reliance on fossil fuels and mitigate the impact of future conflicts on global energy stability. Ukraine has the potential to significantly contribute to European and global energy security. The Ukrainian experience in recovery and reconstruction, based on principles of decarbonization, sustainability, climate and a nature-valued approach, is unparalleled. This conflict — and lessons learned from it — can be a catalyst for Europe and other regions to accelerate their energy transitions.

RESPONSE TO THE 2014 INVASION

One of the key implications for Ukraine's energy security, following the first Russian invasion in 2014, was the country's dependence on imported energy resources, particularly natural gas and oil from Russia. This dependence brought risks, as interruptions in gas supply and rising prices undermined the competitiveness of Ukrainian industry in external markets.

Russia's occupation of Crimea and parts of the Luhansk and Donetsk regions created another challenge. Ukraine lost access to many anthracite coal mines and gas deposits, as well as the Zuyevska and Starobishevska thermal power stations, which have a combined capacity of 4 gigawatts. (A gigawatt is a measure of power that shows how much energy is used or produced in one second. The number of homes a gigawatt could power depends on energy consumption per home, but on average it could power tens of thousands of homes.) By May 2022, this loss had escalated to 21 gigawatts, more than 40% of the Ukrainian power system's total installed capacity of 50 gigawatts. This includes the Zaporizhzhia Nuclear Power Plant (NPP), which accounted for almost 20% of the country's electricity production.

Ukraine's abundant resources, such as energy, minerals and agriculture, could also become targets. Although sectors such as agriculture and coal mining have been widely developed, many of the country's resources had, until recently, been left untapped. Ukraine had planned to boost its economic and energy security by exploiting these resources and reducing its dependence on Russia. However, the 2014 invasion disrupted these plans, especially in the energy industry and mineral-extraction licensing.

The Zaporizhzhia Nuclear Power Plant, Europe's largest, was captured and occupied by Russian military forces in March 2022. AFP/GETTY IMAGES

Russia's illegal annexation of Crimea and its control over Ukraine's Black Sea deposits have given it control over a significant portion of Ukrainian hydrocarbon reserves. Russia is also interested in Ukraine's rare-earth metals — in particular lithium — which are potentially the largest deposits in Europe. These metals are essential for electric vehicle batteries. Most rare-earth deposits, including substantial ones of beryllium, niobium and tantalum, are concentrated in the southeastern

part of Ukraine now occupied by Russia. Ukraine had seen an increase in investment interest in critical minerals before the invasion, attracting proposals from European and North American companies. Partnerships with the European Union were formed to extract raw materials as part of efforts to reduce reliance on China, a dominant supplier of these resources to the EU. These developments show Ukraine's potential as a key player in the critical minerals market.

One of the major consequences of the occupation of Crimea was the loss of the Black Sea gas fields. These fields contained reserves estimated in billions of cubic meters of gas and millions of tons of oil, which could have enabled Ukraine to meet its gas needs through domestic production and even export the surplus. According to various estimates, the reserves of the deep-sea shelf may amount to 3 to 13 trillion cubic meters of gas and more than 1 trillion tons of oil with condensate. Before the conflict, Ukraine had only developed a small portion of these fields, accounting for just 4% of the total capacity.

Gas consumption and production

	Gas consumption, bcm*			Gas production, bcm
Year	Total consumption	Industry	Households	Total
2013	50.4	19.1	27.0	21.4
2014	42.6	14.4	24.2	20.5
2015	33.8	11.2	18.9	19.9

*bcm = billion cubic meters

Moreover, after a series of confrontations with Russia over gas, dating back several years, and followed by the invasion in 2014, Ukraine began to systematically reduce its gas consumption, not only due to deliberate downscaling, but also because millions of Ukrainians became refugees, and many industrial facilities were lost or ended up in the occupied territories. Over this period, Ukraine made significant progress in reducing its dependence on Russian energy resources through measures to improve energy efficiency and facilitate re-exports.

The war also led to a setback in the development of regional offshore wind farms in the Black Sea, causing delays and uncertainties in the region. The uncertainties and security risks in the Black Sea region have prompted Bulgaria and Romania to delay their own offshore energy projects.

Cyberattacks on Ukrainian critical infrastructure were part of Russia's hybrid war strategy from 2014 to 2021. These attacks aimed not only to create chaos in energy system operations but also to gain access to databases and control systems. In the early hours of December 23, 2015, Russian hackers attacked the internal network of the energy company Prykarpattya Oblenergo, resulting in the shutdown of some 30 substations, temporarily leaving about 230,000 residents without electricity. A year later, on December 18, 2016, a similar cyberattack occurred at the Pivnichna substation in Kyiv. That attack disconnected several districts of the city and its outskirts from the power grid. This once again underscored the vulnerability of Ukraine's energy system and the need to develop and implement robust cybersecurity measures.

The events of 2014-2021 provided significant momentum for Ukraine to restructure its energy security policy through efficiency measures, diversifying sources, increasing domestic gas production and upgrading its cybersecurity infrastructure. The priority shifted toward expanding the use of renewable energy sources such as solar and wind. In particular, the total installed capacity of renewable energy sources in Ukraine increased more than 400% from 2018 to 2021 — from 2.3 gigawatts to 9.6 gigawatts. In 2021, the share of electricity from renewable sources reached 8.1% (12.8 terawatt hours) of the total energy mix. Additionally, from 2014 to 2021, Ukraine faced hybrid challenges that required management decisions and became a trigger for sectoral reform. By the beginning of 2020, the Ukrainian energy sector had substantially reformed and adapted to developments, and advanced on its path to European integration and joining the European Green Deal.

Energy became a front in the war, alongside the hostilities playing out in the military, economic, information and cyberspaces. Seven years before its full-scale invasion, Russia disrupted stable energy supplies, leveraging energy as a soft-power weapon to attack Ukrainian prosperity. The energy sector suffered even more after the launch of the invasion in 2022, which rocked it on a scale never experienced before when Russia targeted energy infrastructure with missiles, drones, explosives and artillery.

USING ENERGY AS A WEAPON

The Russian invasion on February 24, 2022, required a total rethink of the concept of energy security. Full-scale war, for the first time, saw the comprehensive use of energy as a weapon, with Russian incursions at Chernobyl and Zaporizhzhia turning these nuclear generation centers into military pressure points. Targeted attacks on critical infrastructure left millions of people without light, heat and water.

The energy sector emerged as a primary target because of its strategic significance to the country's economy, and to the well-being and morale of the Ukrainian public. Targeted missile strikes and self-detonating drone attacks on critical facilities resulted in operational imbalances and network constraints, leading to enforced restrictions on electricity supply to a significant number of consumers. In just one day in 2022, about 30% of Ukraine's energy infrastructure was damaged. The energy crisis caused by Russian attacks underscored the vulnerability of Ukraine's energy infrastructure and the critical need for resilience and strategic planning in the face of such threats.

The West did not take seriously enough the energy risks posed by Russia. Russian President Vladimir Putin's

Workers clean debris in a turbine hall of a Ukrainian power plant destroyed in a Russian attack in April 2024. Russia has launched continual strikes on Ukraine's power grid. AFP/GETTY IMAGES

statements that his country would use gas, oil and other resources as weapons to protect its geopolitical interests were disregarded. Under the illusion that Russia could be pacified, the world continued doing business as usual with Moscow. No Western sanctions were imposed after Russia's invasions of Georgia in 2008 and Ukraine in 2014. These might have hindered the development of Russia's military-industrial complex, or at least sent a message to the Kremlin that aggression has consequences. Instead, Russia's Gazprom continued to build pipelines such as Nord Stream 1, then Nord Stream 2, further involving European businesses in the Kremlin's project and working to separate European policy from economy.

One of the most regrettable manifestations of this war has been the use of peaceful nuclear energy as a weapon. Of particular concern was the pivotal moment in March 2022 when control of the Zaporizhzhia NPP, the largest in Europe and responsible for nearly half of Ukraine's nuclear capacity, was lost. Russian forces swiftly took over the plant in the course of the invasion. Repeated disruptions to the plant's external power supply raised the specter of a potential nuclear disaster. Shelling around the NPP opened a veritable Pandora's box of nuclear safety risks.

In 2022 and 2023, Russia regularly escalated the situation around the occupied Zaporizhzhia NPP by deploying military equipment in the turbine hall of the station, restricting access to International Atomic Energy Agency inspectors, laying land mines around the station's premises, kidnapping and killing energy workers, causing regular blackouts at the station, and so on. Lack of reliable information and unverified rumors about the situation around the plant continue to undermine stability in the region and trigger panic not only among the Ukrainian population, but also worldwide. In addition, during 2022 and 2023, the Khmelnytskyi and South-Ukrainian NPPs also suffered attacks from Russia's Iranian-made Shahed drones.

Ukrainian energy infrastructure, historically a centralized system made up of large power plants and high-voltage transmission lines, proved vulnerable in the face of military aggression. Damage to key generation facilities and transformer substations created the risk of a prolonged system breakdown.

More importantly, recent efforts in accident prevention and safety measures within the power system have shed light on its strengths and vulnerabilities. In addition, the crucial role of distributed generation in enhancing the security and reliability of Ukrainian electricity supply has been underscored. In light of these insights, there is now a pressing need to reevaluate the current approach to energy system development, particularly with a focus on bolstering stability, flexibility and decentralization. This includes exploring the integration of smart technologies, energy storage solutions and demand management systems into distributed generation schemes. As part of this shift toward

a more decentralized energy system, there is a proposal to deploy flexible generation facilities such as gas-piston or gas-turbine plants alongside renewable energy sources and energy storage units. Furthermore, the concept of microgrids is being considered to provide localized power supply in areas disconnected from the main grid.

The most extensive attack on Ukraine's energy system took place on November 15, 2022, when Russia unexpectedly launched 100 missiles, damaging 50% of critical infrastructure: 24 generation units, including thermal power plants, central heating plants, hydropower and pumped storage plants, roughly half of transmission substations and 43% of the main grids. These attacks left over 10 million Ukrainians in darkness, with Kyiv experiencing a record number of power failures. As a result of the attacks and the destruction of facilities, rolling blackouts have been initiated throughout Ukraine. Some regions faced power outages and internet and mobile connection disruptions for more than 10 hours a day.

Since March 2024, ongoing and significant attacks on Ukraine's energy infrastructure resulted in the destruction of about half of its generation capacity. This led to a total loss of nearly 7 gigawatts of available power within the system.

The explosion at the Kakhovka Dam and hydropower plant (HPP) in June 2023 not only resulted in the loss of 35% to 40% of the country's freshwater reserves and massive flooding, but also the loss of the HPP's electricity generation capacity of 334 megawatts. It typically generated around 1 billion kilowatt hours of electricity annually. While this amount may seem small in comparison to Ukraine's total electricity production, Kakhovka HPP plays a crucial role in balancing the use of green energy. Regions such as Kherson, Mykolaiv and parts of Dnipro and Zaporizhzhia are well-suited for green energy development due to their abundant sunshine and windy conditions.

It is worth mentioning that, before the war, more than half of Ukraine's electricity was generated by nuclear power plants (51.4% in 2020). Meanwhile, renewable sources have been developing rapidly over the past decade. For domestic electricity production, 5.1% came from hydroelectricity, 4% from solar energy, 2.2% from wind and 0.5% from other renewable energy sources in 2020. Thanks to the attractive green tariff program in Ukraine, the share of wind and solar energy noticeably increased in the years prior to the war. However, the majority of the potential for solar- and wind-energy generation falls within territories occupied by Russia. The occupation also limits the potential for offshore wind energy, at least in the near future. There are indications that 30% to 40% of solar power plants were damaged. Before the full-scale war, Ukraine had 1,860 megawatts of wind power capacity. Of that, 1,317 megawatts, or 71%, is located in currently occupied territories in the Kherson, Zaporizhzhia, Donetsk and Luhansk regions.

Despite the war, Ukrainian industry has demonstrated resilience and continues to implement wind-generation projects. For instance, the Skolivska wind farm, with a capacity of 54.5 megawatts, started operating in the Lviv region at the end of 2023. In the Odesa region, the 60-megawatt-capacity Dniester Wind Power Plant was completed during the war. In 2023, the first stage of the Tyligulska wind farm, with a capacity of 114 megawatts, was launched in the Mykolaiv region. This plant is expected to be working at its stated capacity of 500 megawatts by 2024-2025. Impressively, three wind power plants with a total capacity of 228.5 megawatts have been completed and launched during the war years, bringing electricity to 400,000 Ukrainian homes.

While one missile can destroy a 200- to 300-megawatt thermal power-plant boiler, it is impossible to cause as much destruction with wind generation when a typical turbine has just 5 to 6 megawatts of installed capacity. That's why renewable energy is not only about climate protection for Ukraine but primarily about energy security and resilience.

Much of Ukraine's clean energy potential is in territory currently occupied by Russian forces, such as these wind turbines near Melitopol, in the Zaporizhzhia region. AFP/GETTY IMAGES

Discussions are underway regarding Ukraine transitioning to low-carbon energy solutions while taking into consideration the continuing role of fossil fuels in the short and medium terms. Ukraine sees a future in its gas balance but also aims to replace some gas usage with hydrogen. The National Recovery Plan identifies the need for more than 30 gigawatts of renewable energy capacity from clean hydrogen, costing $38 billion, with another $7 billion for 15 gigawatts of electrolyzer capacity and $2 billion for hydrogen transport infrastructure. Green hydrogen produced from renewable energy can be used to decarbonize residential and centralized heating systems, and for industrial decarbonization as well.

Ukraine's economic integration with the EU was significantly boosted in 2022 by synchronizing with ENTSO-E (European Network of Transmission System Operators for Electricity), creating new opportunities for electricity trading. Prior to this, only some of Ukraine's power system, the Burshtyn Power Island trading zone, was connected to the European energy network, while most of Ukraine's Integrated Power System (IPS) was linked to Russia and Belarus. This reliance on Russia constrained Ukraine's energy independence. Through concerted efforts by Ukraine, and with international support, synchronization of the Ukrainian IPS with ENTSO-E was achieved. The groundwork for this synchronization was laid in 2017 when national energy provider Ukrenergo signed an agreement for the future interconnection of Ukraine's IPS with continental Europe's power system.

Despite challenges, such as scheduled testing of the power system during the Russian invasion, Ukraine demonstrated resilience and readiness for synchronization with the European power system in 2022. Once Russia invaded, Ukraine swiftly disconnected from Russia's power system and, on March 16, 2022, achieved a critical milestone by synchronizing its power system with Moldova's and integrating with ENTSO-E. This emergency interconnection represents a vital step in Ukraine's progress toward integration into European energy markets and solidifies its energy security.

The synchronization with ENTSO-E resulted in Russia and Belarus losing their ability to influence the technical and economic aspects of Ukraine's power-system operation, boosting independence. This has led to improved reliability because of harmonized cooperation with European partners. Ukraine now has an opportunity to export surplus electricity to earn revenue and can import electricity from the EU in case of a deficit, ensuring reliable electricity supply to Ukrainian consumers.

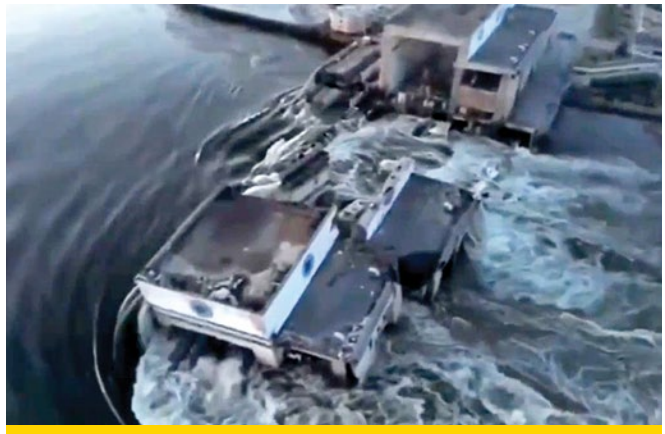
Synchronization with ENTSO-E has laid the necessary foundation for Ukraine's integration into the EU energy market. Further market and regulatory integration with the EU and accelerated development of new technologies will allow Ukraine to supply green and low-carbon energy.

ENERGY SECURITY AND THE GREEN DEAL

It could be argued that hydrocarbon-power Russia has little enthusiasm for the energy transition or carbon emissions neutrality. But Ukraine is working to deal with problems in its damaged energy facilities and, in parallel, to switch to a greener, more diversified, decentralized and resilient energy system. Today, Ukraine seems to have moved away from the legacy practices of previous decades, along with its overdependence on Russian energy sources.

The focal issues for Ukraine currently are:

- Making a smooth and safe shift away from fossil fuels with a focus on energy safety and control over its own energy systems, while moving toward a clean energy future.
- Making sure the supply chains for clean energy are strong. This includes securing the important materials needed and helping new clean technologies grow and expand.
- Ensuring energy affordability by managing the transition to clean energy systems while mitigating price impacts, especially for vulnerable groups.



In this image taken from video released by the Ukrainian Presidential Office, water runs through a break in the Kakhovka Dam on June 6, 2023. Russian forces presumably blew up the dam and hydroelectric power station so that the flooding would obstruct a pending Ukrainian counteroffensive.
THE ASSOCIATED PRESS

Despite facing targeted attacks on its vital energy infrastructure and significant disruptions to energy generation and grids, Ukraine remains resolute in meeting its obligations. The country is committed to rebuilding and advancing its energy sector in accordance with the "Energy Strategy of Ukraine until 2050," aligning with the goals of the EU Green Deal and its ambition for carbon neutrality by 2050. The strategic objectives set forth aim not only to strengthen Ukraine's energy security but also to harmonize with EU standards and demonstrate dedication to a sustainable, low-carbon future.

Pivotal energy projects currently under development are oriented toward sustainability and full compliance with the EU Green agenda. Small-scale renewable energy systems with battery storage are being encouraged through the implementation of the net billing model (a distributed generation regime that allows a person to sell all the electricity that person produces at a regulated rate and to buy the electricity that same person consumes at another regulated rate). This model facilitates the development of small-scale generation, where there is a financial arrangement between

consumers with renewable energy production capabilities — called prosumers — and their electricity suppliers that is in line with EU market regulations. Furthermore, the Ukrainian Ministry of Energy has introduced a draft concept to incentivize the development of renewable energy systems among prosumers in conjunction with net billing. The primary goal is to promote the adoption of renewable energy-system technologies, such as solar and wind power stations with battery storage systems for self-consumption.

Ukraine has initiated implementation of decentralized renewable energy solutions, such as the "Ray of Hope" project, launched in early March 2023 through collaboration between the European Commission, Italian energy company Enel and the Ukrainian Ministry of Energy. Through the project, Enel committed to donating 5,700 solar photovoltaic panels with a capacity of approximately 2 megawatts to Ukraine. These donated panels, each with a wattage of 350, will be installed on the roofs of various public buildings, covering around 11,400 square meters. The distribution of the panels will prioritize key public buildings offering essential services, such as education and health care, as identified by the Ukrainian government, with hospitals being the initial focus for pilot installation.

In addition to these centralized initiatives, there has been a significant increase in local renewable energy projects by firms and individuals. In the past year, many private companies have established solar power stations for their own use, highlighting a rising interest in decentralized renewable energy options across Ukraine. Consequently, the country is moving toward further development of renewable energy through a competitive and market-oriented approach, with the government creating conditions to attract private investments.

Moreover, Ukraine has significant potential to increase green-energy generation through integration into ENTSO-E and further implementation of the EU electricity market rules (market coupling). In addition, by enhancing the capacity of interconnection up to 6 gigawatts, Ukraine may become a key exporter of clean energy to the EU. Europe's interest in diversifying its energy sources away from Russia opens opportunities for Ukraine as a reliable, clean electricity exporter. By becoming a significant exporter of clean electricity to the EU, Ukraine can strengthen its geopolitical position, which not only boosts its energy independence but also diminishes Russia's leverage over European energy supplies.

Since 2022, the issue of energy efficiency has gained significant importance, and not solely from an economic perspective. Ukrainians have experienced the true value of each watt and calorie during blackouts, underscoring the critical nature of energy efficiency. It's a necessity, not just a trend. Industries hold the potential to achieve over 30% energy savings by adopting energy-efficient technologies, while residential and communal sectors could see savings of up to 60%. Despite Ukraine's substantial energy-saving potential, much of it remains untapped, exemplified by the low adoption rate (up to only 12%) of smart meters in homes. Businesses fare slightly better in this respect. To ensure the resilience of the energy system, Ukraine is actively exploring strategies to enhance energy efficiency and optimize energy demand. In the city of Zhytomyr, home to over 200,000 residents, a notable initiative has been implemented in recent years where a renewable energy-focused plan emphasizes energy conservation and leverages local resources.

Eliminating Ukraine's dependence on Russia in the nuclear energy sector is a top priority. This strategy involves completely ceasing the use of Russian fuel, building new nuclear power units and expanding the storage capacity for spent fuel. By 2023, seven of 15 national reactors had already transitioned to using fuel from United States company Westinghouse as part of a program to diversify nuclear fuel sources for Ukraine's WWER-1000 reactors.

A rocket explosion in June 2022 created a huge crater at this solar farm in the small town of Merefa, in the Kharkiv region of Ukraine, amid the Russian invasion. Decentralized power production such as this plant helps make Ukraine's energy system more resilient. AFP/GETTY IMAGES

A significant milestone was reached in September 2023, when the WWER-440 reactor at the Rivne Nuclear Power Plant was successfully loaded with modified Westinghouse nuclear fuel for the first time, marking the start of a promising trial operation. With the breakout of full-scale war in February 2022, Energoatom, Ukraine's nuclear power operator, immediately halted the supply of Russian TVEL fuel. The decision to stop using Russian nuclear fuel has resulted in cost savings of 2.3 billion Ukrainian hryvnia ($58 million) since 2022. The construction of new nuclear power units in Ukraine will enhance the country's energy independence, bolster its energy security and pave the way to achieving climate change mitigation goals.

Without question, the war has had a profound impact on Ukraine's economy, which will lead to significant transformations when the country emerges from conflict. The severance of long-standing economic ties with Russia, alongside Ukraine's push toward EU membership, is already reshaping its position in both regional and global markets. Attracting green investment will be a priority in achieving a swift and sustainable recovery. This process should not only focus on rebuilding existing value chains but also on fostering new industries and infrastructure that align with Ukraine's deepening integration with European and trans-Atlantic economies, and enhance energy security as well.

CONCLUSIONS

Following the first Russian invasion in 2014, Ukraine faced a number of energy crises to which it quickly found solutions — such as re-exporting gas — demonstrating an ability to adapt and build resilience by overcoming challenges. After 2022, Russia shifted strategy to physically destroying the Ukrainian energy sector. This had a direct impact on humanitarian security, as power outages in cities, lack of water and other essential services are liable to lead to an increase in Ukrainian refugees. Stable energy supply also plays a vital role in sustaining military production. By bombing Ukrainian critical infrastructure, it seems that Russia seeks to make the energy system more fragile and unable to meet business demands, as well as to force the Ukrainian government to focus on issues of survival rather than EU integration reforms and development. The combination of these challenges demands that both business and government adapt and develop agile crisis management strategies to quickly respond to crises.

The Ukrainian energy system has coped with numerous problems following massive missile attacks, partially thanks to the help of international partners, including financial support, prompt delivery of equipment, spare parts, emergency electricity supply, etc. The cooperation and solidarity have been valuable tools that have helped Ukraine adapt using technical and managerial resources.

The following milestones will be crucial for Ukrainian energy security:

- An international agreement must be reached on collective sanctions that are triggered automatically in the event of an attack on any country's energy system. The mechanism of such sanctions should be developed and activated preventively, not after the fact, so the consequences of such attacks are clear in advance to a potential attacker.
- A protective system against physical capture or destruction of energy facilities must be implemented. Facilities that provide vital needs for citizens should be protected against external attacks, both physical and cyber. Such a protection system must be default-integrated into the creation of new energy systems throughout Eastern Europe.
- High-level energy resilience is needed, capable of adapting quickly and transforming in case of challenges. Ukraine's energy system has demonstrated its resilient ability to recover, transform and adapt to challenges. In wartime, the energy system has continued to operate, has synchronized with ENTSO-E, and has started supplying electricity to the EU when there has been a surplus in the Ukrainian system. Ukraine is ready to play a key role in redefining European energy security — to lead, be a reliable partner, ensure green electricity supply, export to Europe and actively develop clean technologies.
- A series of missile strikes and blackouts since the February 2022 invasion have made plain that an energy-secure future — both in Ukraine and elsewhere — lies in decentralized energy and energy self-sufficient regions. Decentralizing the energy system and establishing backup power generation can be a preventive measure against future crises, including those caused by climate change. Simultaneously, this decentralization can serve to unify Europe. Small countries should feel as protected as large ones through joint policy and the availability of external aid.
- Finally, in the face of formidable obstacles created by the conflict, Ukraine is adapting its strategies to ensure it continues on the path to a more environmentally friendly and sustainable future. Efforts are underway to bolster distributed generation capacities, with a specific emphasis on expanding the use of renewable energy sources. The green transition is seen as a critical component of Ukraine's path toward integration with Europe and potential EU membership. Embracing the "building back better" principle is central to efforts to transform the Ukrainian energy sector into a more sustainable and resilient framework in the near future. □

The Recovery and Reform Support Team is part of the Ukraine Recovery and Reform Architecture (URA), a comprehensive technical assistance program deployed by the European Bank for Reconstruction and Development (EBRD), in partnership with the European Union, to support critical recovery and reform processes in Ukraine. URA is implemented with the financial assistance of the EBRD-Ukraine Stabilisation and Sustainable Growth Multi-Donor Account, contributors to which are Austria, Denmark, Finland, France, Germany, Italy, Japan, Latvia, the Netherlands, Norway, Poland, Sweden, Switzerland, the United Kingdom, the United States and the EU.

Energy Challenges in the Western Balkans

TRANSITION TO CLEAN ENERGY MUST CLEAR ECONOMIC AND GEOPOLITICAL HURDLES

By **Dr. Ana-Maria Boromisa**, Institute for Development and International Relations, Croatia

PER CONCORDIAM ILLUSTRATION

The ongoing energy crisis is the first truly global one, according to the International Energy Agency (IEA). The crisis began in 2021, caused by factors including surging global demand for natural gas combined with inadequate gas reserves during the extraordinarily rapid economic rebound from the COVID-19 pandemic, and rising prices for carbon dioxide allowances under the European Union's emission trading scheme. Russia's invasion of Ukraine and the resulting international sanctions imposed on Moscow — a major producer and exporter of oil and gas — escalated the crisis.

The crisis has highlighted the challenge of increasing short-term energy security while implementing a transition to green energy sources. This challenge is recognized within the Berlin Process, an intergovernmental cooperation platform among Western Balkan governments (Albania, Bosnia and Herzegovina [BiH], Kosovo, Montenegro, North Macedonia, Serbia), and EU governments and institutions. Berlin Process delegates adopted the "Declaration on Energy Security and Green Transition in the Western Balkans" in 2022.

A green transition requires decarbonization of energy systems. This could improve energy security by reducing reliance on imported fossil fuels, but it also creates challenges related to the development and use of renewable energy sources.

Considering the heavy reliance on fossil fuels in the region, Western Balkan countries adopted a fairly ambitious decarbonization agenda for the period up to 2030. Within the framework of the EU's Energy Community, which was founded to "create an integrated energy market and foster the use of renewable energy, energy efficiency and decarbonization," each country has made commitments that derive from its candidate status for EU membership. The United Nations Climate Change Conference, held in Dubai in December 2023, resulted in a call for governments to transition away from fossil fuels and amplified the green transition challenge.

The IEA defines energy security as the uninterrupted availability of energy sources at an affordable price. The key dimensions of energy security can be described as availability, accessibility, affordability and acceptability (the "4 A's" of energy security). Having energy security means that the energy supply covers all economic and social needs. A comprehensive energy transition is required to align with climate goals while still meeting future energy needs.

The high energy intensity and import dependency of Western Balkan economies make them vulnerable to increases in the price of energy imports. Regional economies rely heavily on fossil fuels (Table 1). Oil is used for transport and coal fuels power plants for electricity production. Only Albania and Serbia produce any oil. All the others have significant import dependency, exposing their markets to volatility in oil prices. From 2018 to 2020, only 3% of the region's oil and oil product imports came from Russia, so the risk of supply disruption is smaller than for the EU.

Western Balkan economies are vulnerable to fluctuations in crude oil and oil derivative prices, but because gas has a limited share in the energy mix, they are not very vulnerable to gas price disruptions. The risk is mainly because the gas supply relies on a single source (Russia) and route.

Table 1. **Energy mix and energy intensity of Western Balkan countries**

	Coal	Oil and oil products	Natural gas	Renewable energy		Energy intensity
	2020 %	2020 %	2020 %	2020 %	Target 2030 %	
Albania	6.8	49.5	1.7	33.1	52.0	N/A
Bosnia and Herzegovina	56.4	21.7	2.4	24.4	43.6	443.36
Kosovo	57.9	28.0	0	15.1	32.0	457.19
Montenegro	37.5	32.5	0	29.4	50.0	283.13
North Macedonia	29.2	28.4	10.7	14.0	38.0	303.3
Serbia	49.6	22.5	12.5	15.7	40.7	402.24
WB6 average	39.6	32.1	4.6	21.9	42.7	
EU average	10.2	34.5	23.7	17.4	42.5	116.38

In a globalized world, the impacts of crises come more rapidly and are more extensive. Weak and less-developed systems are less resilient. Where economic instability exists, crises are usually accompanied by political and geopolitical tensions. Thus, the global energy crisis has exacerbated existing energy security and green transition challenges faced by Western Balkan countries.

A diversified energy mix, lower import dependency and lower energy intensity generally contribute to the security of supply. Because of the high reliance on fossil fuels, significant import dependency and energy intensity, Western Balkan countries face significant energy security risks. For example, electricity in the Western Balkans is mostly produced from coal and hydroelectric energy. A significant share of the total electricity consumption in Albania (32%) and North Macedonia (24%) is imported, and Kosovo imports significant amounts of electricity in winter because of the widespread use of inefficient electric heating. Serbia had to increase electricity imports because of accidents at several thermal power plants combined with adverse meteorological conditions. On the other hand, domestic supply and demand nearly match in Montenegro, and BiH is a net exporter of electricity (27% of its production, but it's mainly from coal). In addition, the energy intensity of the Western Balkans' GDP (283-457 kilograms of oil equivalent, or kgoe, per 1,000 euros) is significantly higher than the EU's energy intensity (116.38 kgoe/1,000 euros, see Table 1). This makes industries, especially energy-intensive industries such as aluminium, steel and fertilizer (25.6% in BiH and 24.2% in Serbia), more vulnerable to volatile prices. As a result, Western Balkan economies are more vulnerable to external risks.

The energy crisis has led to an unprecedented surge in commodity and electricity prices in the Western Balkans, heightening uncertainty. The impact of volatile energy prices is reflected in increased transportation costs (oil and oil derivative prices) and commodity prices. Rising electricity prices have reduced the competitiveness of industries and increased energy poverty. There has been a profound impact on the affordability of energy security. In addition, rising prices constrain investment capacity in energy infrastructure, renewable energy and energy efficiency, thus increasing future supply risk.

Measures aimed at protecting energy-vulnerable groups and mitigating energy poverty have been introduced, but the scope and impact remain limited. For instance, in BiH, energy support measures for the poor focus solely on direct financial support for energy costs and only target the most vulnerable groups.

The current energy crisis and its impact on short-term energy security show that the relationship between the four dimensions of energy security (4 A's) is complex. It depends on a number of factors, including the energy mix, regulation and market structure. Strengthening one energy security element can damage other elements and even reduce total energy security. Addressing energy security challenges requires comprehensive policies capable of

Wind turbines on Selace Wind Farm in Bajgora, Kosovo, churn out 320 gigawatts of electricity annually. Coal-reliant Kosovo is utilizing foreign investment to transform its energy supply. GETTY IMAGES

Table 2. **The 4 A's of Energy Security**

	Availability	Accessibility	Acceptability	Affordability
Oil	***Decreasing*** Limited regional availability; proven global resources are limited; new discoveries are still possible.	***Decreasing*** Transportation is the most convenient; geopolitical risks and investment barriers are rising.	***Decreasing*** Greenhouse gas emissions and dependence on OPEC and Russia limit acceptability.	***Decreasing*** Carbon pricing and oil price volatility reduce affordability.
Natural Gas	***Limited and decreasing*** No reserves in region; proven resources globally and significant exploration potential.	***Ambiguous*** New infrastructure needed; LNG increases market flexibility and diversification of routes and sources.	***Limited and decreasing*** Acceptable as transitional fuel; cleaner and more efficient than oil and coal.	***Ambiguous*** Requires significant investment; prices are volatile; carbon pricing further increases costs.
Coal	***Available*** Existing reserves in most Western Balkan countries; proven global reserves.	***Locally accessible*** Infrastructure in place but needs some upgrades (e.g., railways and ports).	***Decreasing*** Climate considerations and air pollution standards decrease its acceptability.	***Decreasing*** Carbon pricing and need for carbon capture and storage increase costs.
Hydro Energy	***Uneven*** Potential unevenly distributed within the region; significant annual oscillations; changing water availability because of climate change.	***Decreasing; limited for new facilities*** Environmental considerations and infrastructure constraints limit accessibility.	***Limited for new facilities*** Because of environmental and social impact.	Higher capital but lower operation cost compared with most fossil fuel options.
Sun	***Variable/intermittent*** PV and solar thermal can be important at local scale.	Current infrastructure inadequate; investment in production facilities and network necessary; some critical materials for production of PV need to be imported.	Mostly considered a sustainable energy source; emissions are limited during life cycle; utility-scale facilities require significant space, making siting challenging.	***Increasing*** Technology becoming more affordable; carbon pricing makes it more competitive compared with fossil fuels.
Wind	***Variable/intermittent*** Unevenly available.	Infrastructure investment necessary (production facilities, network, forecast-balancing).	Mostly considered a sustainable energy; limited life cycle emissions; siting of facilities a challenge over environmental concerns. Only onshore possible in most of the region.	***Increasing*** Decreasing technology cost and increasing carbon prices improve affordability.
Nuclear Energy	Resources not locally available; resources available globally, though uranium processing is constrained.	Significant human resource and technology constraints; limited access to advanced technology.	***Ambiguous*** Public opinion generally not supportive; issues related to waste disposal and safety risks; no greenhouse gas emissions in operation.	***Limited*** High lead period for construction, high capital costs.
Biofuels	***Available*** Fuel wood is currently most used biofuel.	Infrastructure and regulatory barriers limit accessibility.	Depends on technology and energy-food-water nexus.	***Limited, increasing***
Geothermal	***Available***	Lack of infrastructure; unsupportive regulation; human resource constraints.	***Increasing*** Clean and renewable sources.	***Limited, increasing***

balancing short- and long-term policy goals.

The main impacts on each dimension of energy security, for fossil (oil, gas, coal), renewable and nuclear energy are presented in Table 2.

As shown in Table 2, there are energy security risks for each energy source. The impact on energy security varies over time and depends on the energy mix. Generally, the energy security of fossil fuels is decreasing because of their climate impacts and also political risks related to suppliers (for oil) and transport routes (for gas). However, access to liquefied natural gas (LNG) supplies can help reduce gas supply constraints posed by pipeline infrastructure.

Diversification and developing adequate energy storage have been priorities for increasing security of supply. These are challenging issues in the Western Balkans. For instance, Albania's legislation on the minimum reserves of crude oil and petroleum products required for energy supply security is not consistent with EU laws and regulations. In addition, Albania lacks a central holding facility for its emergency oil reserves.

Natural gas makes up a considerably smaller share of the energy mix in the Western Balkans than it does in the EU (4.6% compared with 23.7%, Table 1). While Russia is the sole source of gas in the region, Western Balkan countries have limited vulnerability to Russian gas import disruptions. This is less true for Serbia and North Macedonia, whose reliance on Russian gas imports reached 12.5% and 10.7% respectively in 2020 (Table 1). Kosovo and Montenegro do not have a natural gas market, while Albania has only been connected to an international gas pipeline — the Trans Adriatic Pipeline (TAP) — since 2020. Albania intends to connect its Vlora thermal power plant through both a pipeline and an LNG terminal to improve energy security. Preliminary agreements for gas supply have been signed.

However, plans for development of the gas infrastructure have raised concerns from civil society, in particular regarding the ecological protection of Vlora Bay.

In 2022, Serbia concluded a new three-year contract for Russian gas after the previous 10-year deal expired in 2021. The price increased almost 30% (from $270/1,000 cubic meters to $340-350/1,000 cubic meters), but is still significantly lower than market prices in Europe, which were around $900/1,000 cubic meters. In BiH, gas provides only 3% of the energy supply, but it is very vulnerable to disruption, coming from a single source (Russia) through a single pipeline. Each of the country's two political entities, the Federation of Bosnia and Herzegovina and the Republika Srpska, has a long-term contract with Russian gas supplier Gazprom.

The green transition presents opportunities for economic growth, job creation and poverty alleviation. Prioritizing investments in clean energy can address energy poverty by providing affordable and reliable access to electricity, thereby improving living standards and promoting social equity.

Regarding the accessibility of gas, the Federation entity has been slow to adopt the law and permitting procedures for the Southern Gas Interconnector project. This is one of the flagship projects of the EU's Economic and Investment Plan. Its implementation is expected to strengthen the integration of the Western Balkans into the European gas market and increase supply security. At the same time, BiH is considering a new Eastern Gas Interconnector to be funded by Gazprom. This interconnector would diversify supply routes, but not sources, thus the impact on security of supply would be ambiguous.

Domestic coal is widely used in the region for electricity production. The exception is Albania, which relies primarily on hydropower. Extending the lifetime of current coal power plants or considering the construction of new ones has been the primary response to the energy crisis. BiH extended the lifetime of two coal power plants (Kakanj and Tuzla). North Macedonia and Kosovo announced that they will postpone plans to phase out coal-fired power plants over the next few years.

Extending the lifetime of power plants that rely on domestic lignite coal increases security of supply. However, combined with delays in phasing out coal subsidies and alignment with the EU Emissions Trading System, these measures undermine environmental and decarbonization commitments. Failing to consider the true greenhouse gas-emission costs incentivizes the use of outdated coal units and poses environmental and security risks.

There are no nuclear power plants in the Western Balkans and most countries in the region have not expressed any intention to build one. However, neither has any expressed opposition to the construction of such facilities. Because of barriers for the deployment of nuclear energy, such as insufficient know-how, and lacking financial resources and public acceptance, there is a stronger economic and strategic rationale to prioritize less capital-intensive and faster-to-adopt alternatives, such as wind and solar energy. Still, at the first nuclear energy summit of the International Atomic Energy Agency in March 2024, Serbian President Aleksandar Vučić said that his country would change its laws banning the building of nuclear power plants.

Renewables' share of the energy mix in the Western Balkans is relatively high (ranging from 14% in North Macedonia to 33.1% in Albania). Most renewable energy in the region comes from hydropower. Albania, which relies predominantly on hydropower for electricity production, positions itself as a regional renewable energy leader. However, hydropower production is vulnerable to climate change and price volatility. Albania is a net importer of electricity at a rate of 30% per year, as its domestic hydroelectricity production is not sufficient to cover its needs. In addition, the concession contracts for hydroelectric power plants are not sustainable. The small plants have a significant impact on biodiversity and local communities, notably in protected areas, where around 100 concessions/private investments are located. Civil society groups challenged plans for a hydropower plant in Skavicë, on the Drin River, during public consultations, questioning the regularity of concession processes, the validity of environmental impact assessments and lack of information on the resettlement plan.

Renewable energy generation from other sources, such as solar, wind, biomass (wood and wood waste, municipal solid waste, landfill gas and biogas, biofuels) and geothermal is in its infancy. Albania plans to use more photovoltaic (PV), or solar, and renewable energy from wind. The exploitation of its vast solar and wind resources would significantly improve Albania's energy security and reduce its vulnerability to climate change impacts. Development of two solar photovoltaic farms, with a total installed capacity of 240 megawatts (140 MW in Karavasta and 100 MW in Spitalla), is ongoing.

There has been progress in implementing regulation that could support the economic and financial viability of renewable energy projects. In 2021, Albania launched an auction on wind farms, with an installed capacity of 10 MW to 75 MW. The first-phase contracts were awarded in June 2023, and in July 2023 three bidders were awarded a total of 222.5 MW in capacity. To accelerate renewable electricity production and facilitate the transition from hydropower to other renewables, more auctions should be conducted.

In 2023, Kosovo adopted an ambitious new energy

Workers build photovoltaic modules at Kosovo's first solar plant, near the town of Slatina. The factory manufactures solar panels designed for use in especially hot climates. AFP/GETTY IMAGES

strategy and had its first solar auction. There are plans to adopt a law on renewable energy sources. In BiH, introduction of the virtual power plant model in 2022 has enabled small-scale renewable energy sources to reach wholesale markets via aggregation. This incentivized renewable energy producers to step out of the support schemes (feed-in tariffs).

Investments in networks would make renewable energy more accessible. Introduction of carbon pricing would change relative prices of renewables compared with fossil fuels, reflecting the diminishing acceptability of fossil fuels and making them less affordable. Energy transition to renewable energy sources and climate policy is expected to improve energy security by increasing energy independence. But this requires addressing the intermittence of renewable energy sources, such as wind and solar, and the vulnerability of hydropower to climate change.

Current energy security challenges due to energy mix and import dependency can only partially explain policy choices and short-term energy security interventions. Some energy policy choices are influenced by foreign policy priorities, (geo)political context and attempts to balance relations with Russia, the EU and neighboring countries, a sometimes-delicate balancing act.

North Macedonia, whose sole gas supplier is Russia, fully aligns with the EU's Common Foreign and Security Policy and participates in sanctions against Russia. On the other hand, Serbia and BiH have not participated in EU sanctions against Russia. While Serbia's dependency on Russian gas imports is significant, the small share of gas in BiH's energy mix does not explain such a reluctance.

In the Western Balkans, limited attention has been given to developing new technologies for renewables, energy efficiency and storage. The focus on crisis management has, at times, diverted attention from critical systemic reforms. Such reforms require addressing vulnerabilities within energy systems, stemming from underinvestment and inadequate regulation, and those beyond energy systems. In general, systemic vulnerabilities beyond energy systems are associated with economic fragility (low employment rate, outdated and inadequate infrastructure), political instability (weak rule of law, inefficient governance structures) and social tensions (ethnic tensions, poverty, inequality, brain drain). As a result, the energy security challenge in the Western Balkans extends beyond immediate financial constraints and beyond the energy sector.

The current focus is primarily on availability and affordability, while civil society and environmentalists emphasize environmental and climate challenges. Long-term energy security requires addressing decarbonization, transition to renewables, improving energy efficiency and dealing with the intermittency of renewables. Achieving security of affordable supply and reducing emissions are critical steps.

The energy crisis has intensified concerns about disruptions in supply chains, increases in commodity and electricity prices, and the impact on the most vulnerable

A worker welds a pipe on the Bulgaria-Serbia gas pipeline, near Kostinbrod, Bulgaria, in February 2023. The long-delayed connector pipeline will boost security of gas deliveries. AFP/GETTY IMAGES

citizens. Rising energy prices fuel overall inflation and hurt confidence, thus endangering investment capacity. The impact of the crisis on investment capacity negatively affects Western Balkan countries with speculative (higher-risk) credit ratings, creating a special challenge in financing energy transition mechanisms.

It is important that the immediate crisis response — dealing with oil and gas supply disruption risks and price volatilities — not harm the structural realignment of the energy system with climate goals. The goal is for the transition to facilitate development of an affordable and secure supply of decarbonized energy. This includes reducing emissions to "net zero" within a time frame that allows alignment with the targeted maximum increase in global temperatures of 1.5 degrees Celsius.

The energy crisis can boost clean energy deployment and become a major game changer. However, inadequate short-term responses could lead to locking in fossil fuel usage and reduce capacity to invest in clean energy, thus endangering the achievement of longer-term emission goals. The green transition presents opportunities for economic growth, job creation and poverty alleviation. Prioritizing investments in clean energy can address energy poverty by providing affordable and reliable access to electricity, thereby improving living standards and promoting social equity.

On the other hand, lack of investment intensifies energy security risks and endangers the green transition. Renewable energy reduces the need for energy imports, which increases energy security. A transition to clean energy will bring major structural changes to the generation profile of electricity systems. This requires increasing system flexibility and resilience. However, in the Western Balkans, the expansion of variable renewable generation has been modest.

Transitioning away from coal while ensuring energy security poses a significant challenge. There is huge potential to increase the share of renewables (see Table 1). In December 2022, the Energy Community Ministerial Council adopted the 2030 climate and energy targets. These targets provide the foundation for energy transition and could support energy security by ensuring affordable domestic sources. Achieving the targets requires comprehensive policies, supportive regulatory frameworks, adequate market institutions and investment.

Western Balkan countries have, under the Energy Community Treaty, committed to improving their market regulation. Alignment with EU energy legislation should enable the integration of Western Balkan energy markets into the European energy market, including the carbon-offset market.

Comprehensive policies are yet to be developed. The Western Balkan countries' Energy Community target commitments are not fully transposed into national plans. For instance, in mid-2023, Serbia published its draft National Energy and Climate Plan (NECP), which should

provide a road map for achieving the 2030 targets. But Serbia avoided clear commitments in its draft NECP regarding carbon pricing or ceasing coal-fueled energy production, and the energy efficiency and renewable energy targets included were less ambitious than those Serbia had agreed to at the 2022 Energy Community Ministerial Council.

EU legislation treats energy efficiency as an energy source. The Regulation on the Governance of the Energy Union and Climate Action and the Energy Efficiency Directive established energy efficiency as a first principle. The principle requires that energy efficiency be recognized as a priority in investment decisions in all sectors (going beyond energy systems) and at all levels, including in the financial sector. The energy efficiency first principle aims to ensure that only necessary energy is produced, investments in stranded assets are avoided and that demand for energy is reduced and managed in a cost-effective way.

In implementing the energy efficiency first principle, there is potential to improve legislation related to:

- The energy efficiency obligation scheme
- Energy labeling
- Increasing the number of electric vehicles in national car fleets
- The minimum energy performance of buildings
- Energy efficiency measures related to purchasing by public authorities

Inadequate investment in diversifying energy sources, upgrading existing infrastructure and decarbonizing the energy sector exacerbates dependency on volatile fuel markets. This undermines current energy security and heightens energy security risks into the future. Outdated energy infrastructure hinders efficient energy distribution and supply, and the integration of renewable energy. Investment in modernized grids, interconnections and energy storage facilities is crucial for decarbonization.

Infrastructure investment (e.g., in storage capacity), regulation and addressing emerging issues, such as digitalization and cybercrime, are necessary for efficient emergency preparedness and response. The diffuse and decentralized nature of much renewable energy generation and decentralized trading raises the risk of cyberattacks, as the attack surface is higher than in a centralized system. In addition, clean energy technologies rely on metals and minerals that are in tight supply and whose production is dominated by just a few nations.

Conclusion

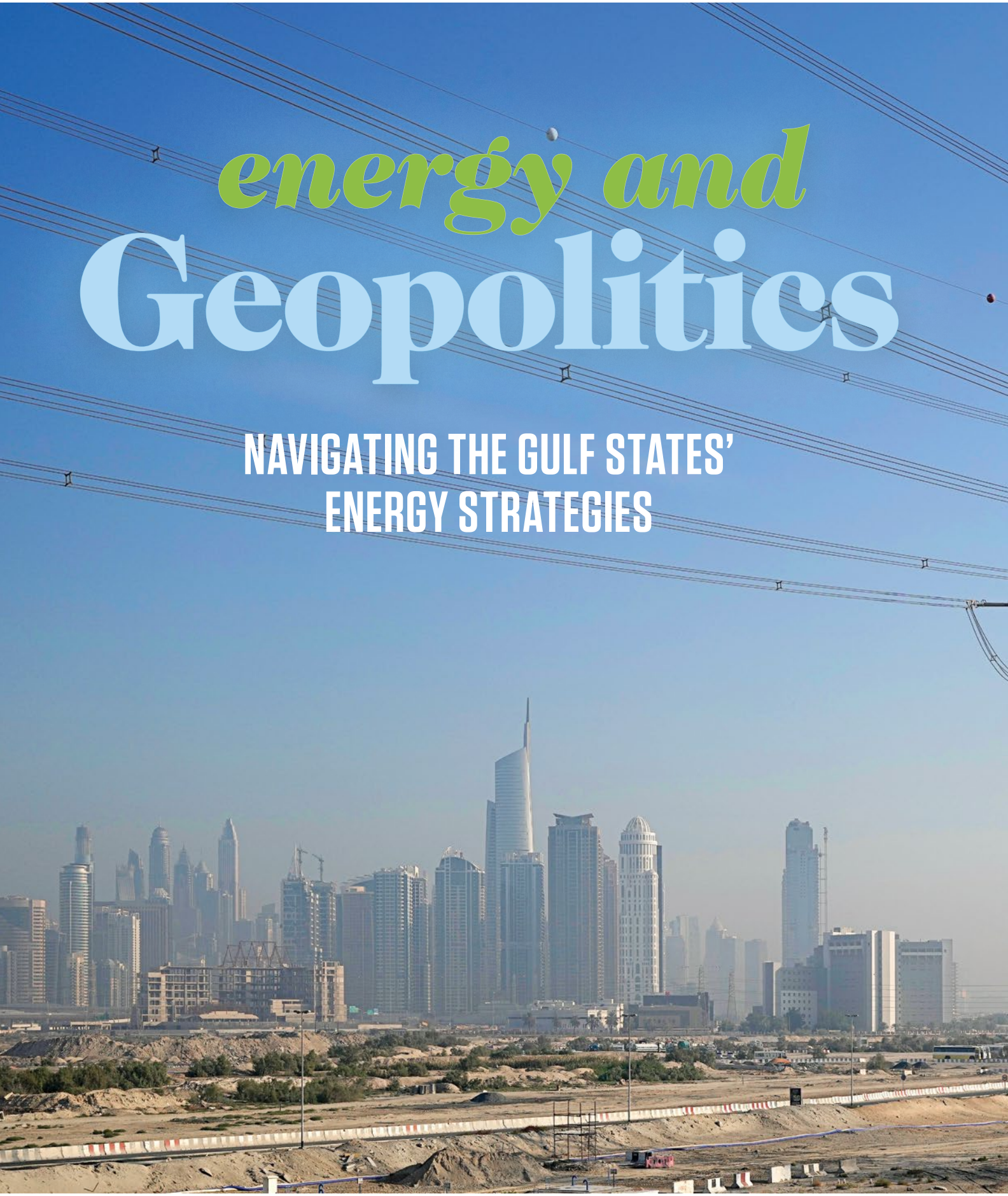
The countries in the Western Balkans have prioritized security of supply and affordability over other aspects of energy security. The focus on crisis management has, at times, diverted attention from critical systemic reforms. Environmental and climate concerns are gaining attention from civil society, but to a lesser extent from policymakers. This challenge is particularly relevant for regions heavily reliant on coal. Increasing energy security by investing in domestic, low-quality fossil fuels can impede the energy transition, and it conflicts with the Paris Agreement and efforts to reach net-zero emissions.

A power plant in Tuzla, Bosnia and Herzegovina, uses coal to generate electricity. The coming transition from fossil fuels to renewable energy will phase out plants like this. AFP/GETTY IMAGES

Increasing long-term energy security requires energy transition. Energy security is expected to suffer during the difficult energy transition from cheaper fossil fuels. However, climate policies can improve energy security by accelerating the replacement of fossil fuels with domestically produced renewable energy. Renewable energy is gaining importance in the big energy security picture. Formulating and implementing good policies to ensure reliable energy access during the transition is a challenge. Holistic solutions must be found to address governance, environmental and social issues.

Energy security strategies should include investment in infrastructure compatible with renewable energy sources and decarbonized (electricity-based) transportation. Expansion of renewable energy production capacities creates new risks to energy security, including potential import dependency for transition metals, necessitating import diversification for critical materials. The higher upfront costs of renewable energy are expected to be compensated by lower operating costs. Considering financial constraints and the weak credit ratings of Western Balkan countries, deployment of renewables will require implementing new financial models.

The intermittency of renewable energy sources, such as solar and wind power, poses a challenge to ensuring an uninterrupted energy supply, a key aspect of energy security. Policies have significant impacts on availability, cost, reliability and the environmental impact of energy systems. Thus, transposition of EU laws and regulations should be customized with consideration for local contexts. Implementation of the energy transition faces two prominent challenges: financial and human. Financial resources are necessary to translate plans and programs into concrete actions/investments, while developing adequate administrative capacity requires adequate human resources. □



energy and Geopolitics

NAVIGATING THE GULF STATES' ENERGY STRATEGIES

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Arabian Gulf countries, as major net hydrocarbon exporters, have long played a significant role in supplying the energy that fuels socioeconomic growth and reinforces global energy security. Now, the region — also known as the Persian Gulf — is emerging beyond its traditional role of key player in the fossil fuel-dominated world into a potential driver of global energy transition.

To reflect these shifts in their energy strategies, Gulf states have developed policies that evolve around three orders of energy interest. Their default interest is to reinforce the predominance of fossil fuels in the global energy system. Their second is to maximize the space for hydrocarbons while still being part of climate solutions. The third is to align with mainstream policies driving the global transition. While these orders of energy interest may appear mutually exclusive, Gulf nations are effectively advancing various vectors of engagement in pursuit of seemingly divergent energy objectives.

In an environment of rising geopolitical and geoeconomic uncertainty, Gulf states are attempting to exercise a greater degree of agency in their foreign policies to address energy security risks and manage the global energy transition. Conflicts such as the Russia-Ukraine war and instability in the Middle East have accelerated the transition away from fossil fuel-based energy systems and, to some extent, altered global energy supply dynamics, but these developments are unlikely to trigger major shifts in the Gulf's strategic energy priorities, which are now focused on the Indo-Pacific market. However, the Gulf's current energy strategies will have a significant impact on shaping strategic partnerships with European nations.

Three orders of interest

The Gulf nations' traditional and default interest has been to reinforce the leading role of fossil fuels — particularly oil and gas — in the global energy system by implementing strategies aimed at delaying the transition from such fuels for as long as possible. The underlying reasons are not hard to comprehend. The Gulf is a major stakeholder in a global system that depends on oil and gas for 55% of its energy demands. The region is home to almost half of the world's oil reserves, accounts for one-third of global oil production and is the largest source of crude oil exports. The region also boasts the world's largest share of gas reserves (40%) and is home to one of the largest producers of liquefied natural gas (LNG). Oil and gas revenues constitute more than 60% of government

Dubai, United Arab Emirates, hosted the COP28 United Nations Climate Summit in December 2023.

budgets for Bahrain and Saudi Arabia, more than 70% for Oman, and more than 80% for Kuwait, Qatar and the United Arab Emirates (UAE). Therefore, a rapid transition away from hydrocarbons is likely to significantly harm these countries' economic growth and welfare. By extension, such a development could also affect the stability of regimes that heavily rely on oil- and gas-export revenues.

The Gulf states have been continually increasing energy extraction, refining capacity and petrochemical output in the past decades. Plans to further boost hydrocarbon production will result in higher exports, but also higher emissions. The Gulf nations' energy interests are shaped by the desire to maintain their fundamental role in the global energy trade, and by opposition to mainstream views on human-caused sources of climate change. Even though all Gulf states have signed and ratified the Paris Agreement, the environmentally damaging hydrocarbon industry continues to expand throughout the region. Because of the region's excessive dependence on hydrocarbons and support for policies that encourage expansion of this sector, Climate Action Tracker rates all Gulf nations' efforts as critically insufficient to meet their climate commitments. In addition to attempts to move to the forefront of the energy transition and climate-change impact mitigation efforts, the UAE plans to increase energy capital spending ($150 billion) for the period of 2023-2027 in upstream oil and gas exploration and development. Gulf nations continue to invest significantly in refineries and petrochemical facilities abroad to ensure stable demand for their crude oil and natural gas over many years. This long-term strategy helps secure their market position and guarantees a consistent flow of revenue.

As Fatih Birol, head of the International Energy Agency (IEA), pointed out, every energy company will be affected by the energy transition and will have to respond in one way or another. A key question is whether oil and gas companies should be viewed as part of the problem or could become key actors in solving it. Apparently, Gulf states have decided to maximize the diminishing space for hydrocarbon use to thrive while being part of the climate solution by advocating for lower-carbon and lower-emission oil and gas industries. This second order of energy interest reflects the Gulf states' willingness to contribute to positive climate solutions as long as they can reframe the antifossil fuel perspective.

The second order of energy interests is predicated on a level of divergence from supporting the fossil fuels industry, but not to an extent that would break with the status quo. This strategy is illustrated in the "balanced" approach to energy transition that concurrently ensures sustainability, energy security and economic prosperity for the oil- and gas-rich Gulf nations. A statement made by the president of the 2023 United Nations Climate Change Conference (COP28) and UAE's special envoy for climate change, His Excellency Dr. Sultan Ahmed Al Jaber, who is also the minister of industry and advanced technology, head of the Abu Dhabi National Oil Co. (ADNOC), and chairperson of the Masdar Co., perfectly illustrates the Gulf's energy priorities: "The work focus should be on stopping emissions and not abandoning the current energy system before the future energy system is ready."

The leaders of the Gulf states recognize that certain state-owned enterprises have the potential to succeed in a lower-carbon economy. Saudi Aramco and ADNOC currently rank among the top five upstream hydrocarbon companies globally in terms of low carbon dioxide emission levels. With marginal costs of extraction at $3 and $7 per barrel of oil, the two companies are in favorable positions to incorporate oil into the ongoing energy transition. In 2021, Qatar agreed to spend $200 million on emissions reduction technology for the expansion of its giant North Field gas field that will result in a product with 30% less emissions than other competing sources of LNG. Saudi Aramco announced plans to capture the lion's share of blue hydrogen demand by 2025, and it was the first to export blue ammonia to Japan in 2020 and to South Korea in 2022. Qatar also is planning to build the world's largest blue ammonia plant to produce 1.2 million tons per year. The implication of the Gulf energy giants' second order of energy interests is, therefore, to promote the production and consumption of oil and gas with lower emission levels that can be achieved through carbon-capture technology, resource circularity and hydrogen development.

Some Gulf states have also adopted a third-order interest strategy to align themselves with certain mainstream policies and norms associated with the energy transition. This is far from their preferred response to a transition away from hydrocarbons. What support there is for this strategy tends to be government driven and conditioned by economic diversification and intangible benefits related to prestige and modernity. Gulf states cannot overlook the significant change in foreign direct investment trends in the global energy system, which now favor nonfossil fuel ventures.

In line with this strategy, the Gulf oil and gas giants are institutionalizing their commitments to clean energy transition and climate change mitigation, and to adaptation efforts by participating in international meetings and promoting domestic clean energy initiatives. All Gulf states are signatories of the Paris Agreement, with the UAE being the first country in the Middle East to sign it. They have submitted updated versions of "nationally determined contributions" and adopted national energy strategies that outline and communicate each country's climate goals, which in the case of Saudi Arabia and the UAE contain more ambitious targets. They have also rolled out, albeit at varying paces, large-scale domestic renewable energy projects. With a 2-gigawatt capacity, Al Dhafra Solar PV is the world's largest single-site solar power plant and one of the groundbreaking renewable energy projects implemented by the UAE. When completed in 2030, the world's largest single-site solar park — Mohammed bin Rashid Al Maktoum Solar Park — will reach a capacity of 5 gigawatts. Abu Dhabi hosted the International Renewable Energy Agency in October 2024 and Dubai hosted COP28 in late 2023. Since 2006, the UAE's Masdar Co. has invested over $20 billion in 30 countries for the development of 11 gigawatts of solar, wind and waste-to-energy power generation projects. These are a few examples of the Gulf nations' ambitious energy and economic diversification targets.

Saudi Arabia has developed its Vision 2030 economic plan

to introduce 60 gigawatts of renewables to the overall energy balance by 2030. If realized, these plans will turn the world's largest oil-exporting country into one of the largest contributors to global decarbonization efforts. The UAE is offering the lowest bids for renewable energy projects to accelerate the transition; it aims to achieve 44% power generation from renewables by 2050, up from about 7% today. As indicated in its Green Initiative program, Saudi Arabia has even more ambitious targets, aiming to transition 50% of its energy needs to renewable sources by 2030. The regional leaders boast a large reserve of cost-competitive and often low-carbon-intensity supply and are well positioned to compete for buyers. Yet, considering the role Gulf nations play in the global oil and gas supply chains, it is not surprising that they have always had and will continue to have a challenging relationship with energy transition and climate change.

Installed renewable energy capacity versus national targets

Country	Renewable energy capacity of the total power supply	Renewable energy targets
Bahrain	0.10%	20% by 2035 of total energy mix
Kuwait	0.40%	15% by 2030 of electricity generation
Qatar	0.10%	20% by 2030 of electricity generation
Oman	0.40%	30% by 2030 of electricity generation
Saudi Arabia	0.20%	50% by 2030 of electricity generation
UAE	7.00%	44% by 2050 of electricity generation

Oil- and gas-rich Gulf states mostly resisted accelerating the energy transition and joining pro-climate endeavors before COP26. Then, an unexpected turn occurred with the Gulf nations' decision to place climate and clean energy commitments at the center of their energy and economic development strategies through net-zero emissions pledges. In 2021, the UAE was the first Gulf nation to pledge net-zero emissions by 2050. Net-zero pledges by 2060, from Saudi Arabia and Bahrain, followed. At COP27 in 2022, Kuwait and Oman pledged to reach net-zero emissions by 2050. Critics of the Gulf states' climate change policy planning say that these pledges have been largely driven by international reporting obligations and are part of a strategy to rebrand the Gulf states' images in line with global climate change and sustainability movements. Despite sizable climate pledges and large-scale projects, there is concern that neither the UAE nor any other Gulf nation is on track to meet self-declared clean energy and climate targets. While some experts have labeled these initiatives as greenwashing, others welcomed them as an important achievement of the climate and energy transition agenda. The latter believe that expertise in hydrocarbons and possible advantages in renewable energy make the Gulf nations potential drivers in promoting sustainability initiatives worldwide by integrating hydrocarbon-fired facilities with clean energy systems and diversifying the energy mix by integrating renewables, nuclear power, hydrogen and carbon capture and storage.

The Gulf and Europe's energy security

With new sources of energy discovered and the energy transition accelerating, limited energy resources will likely be less a source of conflict in the future. Changing energy trading dynamics and shifts in strategic relations between the world's largest suppliers and consumers, however, may trigger conflicting dynamics and affect energy security.

The Russia-Ukraine war is among those major events that have altered global energy trading. It has been three years since the Russian invasion, which makes it possible to trace the impact of the conflict on energy security and assess shifts in trade dynamics. The war and the resulting European exodus from Russian oil and gas markets are incentivizing Russia to expand its export capacity to Asia, while European customers are showing a greater interest in Gulf energy resources. These developments present both opportunities and risks for broadening European Union-Gulf energy cooperation.

Russia's invasion of Ukraine in February 2022 has led to dramatic spikes in oil and gas prices in Europe, some energy shortages and the urgent need to move away from dependence on Russian energy resources. To meet Russian fossil fuel shortfalls, the EU has turned to suppliers in the Middle East and North Africa. Several European ministers have recently conducted visits to Algeria, Azerbaijan, Egypt and Israel, with the aim of exploring new sources of natural gas. However, the expected increase in supply is not significant enough to make a substantial impact on the European energy market. Considering the Gulf region's resource potential, it is not surprising that the EU attempted to embrace the Gulf states as key new energy partners.

A few months after the outbreak of war in Ukraine, the European Commission announced the REPowerEU plan, intended to speed Europe's transition away from fossil fuels, and especially from its dependence on Russia. The same day, the EU announced a significant strategic partnership with the Gulf Cooperation Council (GCC) states to enhance collaboration. While the document covers a wide range of areas for collaboration, including economic, security and institutional ties, the focus is clearly on energy.

European leaders' visits to the Gulf hydrocarbon producers have, to a certain extent, been paying off. The Energy Deals Tracker listed several recent agreements between European states — including Austria, France, Germany and Italy — and Gulf energy-producing nations. German Chancellor Olaf Scholz toured the Gulf, which resulted in a long-term deal to import LNG from Qatar, and energy partnerships on collaboration in hydrogen development and energy efficiency initiatives. France signed a comprehensive strategic energy partnership with the UAE in 2022. Alongside LNG cooperation, Italian energy multinational Eni agreed to cooperate with Saudi Arabia on a wide range of sustainability initiatives.

Most of these deals between EU and Gulf states are, for now, short-term and focus on diversifying European oil and gas supplies.

His Excellency Jasem Mohamed Albudaiwi, secretary general of the GCC, repeatedly highlighted that the Gulf nations are reliable partners in ensuring energy security worldwide. With new developments unfolding, it is imperative for Europe to reevaluate and enhance its relationship with the Gulf. Manifold benefits make it a compelling proposition for all parties and give more impetus to the partnership. For Western nations, however, expanding and deepening ties with the Gulf energy suppliers come with obvious complications, not least of which is the continued use of fossil fuels, considering the climate crisis. Europeans risk replacing a geopolitically problematic dependency on Russia with a potentially problematic dependency on the Gulf, which is also grappling with widening and intensifying conflicts in the Middle East.

A Saudi official passes a display showing a map of the kingdom at the "KSA Green Transmission Journey" exhibition during the Security and Development Summit in Jeddah, Saudi Arabia, in 2022.

The Gulf is moving away from the decades-old, one-dimensional policy of aligning with the United States toward a multidimensional foreign policy. This change increases geopolitical uncertainty in the region, but Gulf leaders largely perceive it as necessary to exercise greater agency and pursue their own energy security priorities, and to provide security for energy and trade routes and contribute to the global energy transition. Gulf policymakers explain this policy orientation as a hedging strategy, through which they are trying to sustain relationships with all major (competing) powers. They want to keep all options open to offset multiple risks in the face of increasing geopolitical and economic uncertainty. With this strategic focus, Gulf leaders will be less likely to form alliances but will give preference to stronger partnerships with regional and global players. The Gulf states have, to a varying degree, built networks of partnerships involving China, the EU, India, Israel, Pakistan, Russia, Turkey, the U.S., etc., in a bid to diversify their foreign relations and acquire greater autonomy. In pursuit of greater autonomy and geopolitical maneuverability, the Gulf nations' pivot to Asia has accelerated significantly over the past two decades. Despite Europe's interest and evident energy demand, Gulf suppliers' ability to redirect oil and gas in significant quantities will be constrained by their long-term strategic orientation toward Asia.

Plans have already been set in motion to increase oil and LNG exports to Europe, but this should not be taken for granted. Since the mid-2000s, the global energy trade in oil and gas has shifted from the Atlantic basin to the Indo-Pacific, with Asian economies increasing demand for energy. The Indo-Pacific region is projected to dominate increases in global energy demand by 2040, with China, India and Southeast Asia accounting for two-thirds of that growth. Efforts to shift from fossil fuel-based economies to ones driven by sustainable energy will not end dependence on oil and gas in that part of the world. Most of the Gulf's oil and gas currently flows to Asia, where the UAE, Kuwait and Oman export 96%, 80% and 70% of their crude oil, respectively. As far as oil and gas are concerned, Asia will remain dependent on Gulf energy as other options do not seem promising at this point.

Even the Gulf suppliers' new deals with European consumers are insignificant compared with their energy supply commitments to Asia. In 2022, Germany signed a 15-year deal with Qatar to import 2 million tons of LNG starting in 2026. Concurrently, Qatar signed two long-term gas supply deals with China in 2022 and 2023, each for 27-year periods, to deliver 8 million tons of LNG. Another Qatari agreement with Bangladesh is expected to increase export capacity to 3.3 million tons of LNG. The amount of gas to be imported by Germany from Qatar is about 17 times less than that supplied by Russia before the war. The relatively small size of the contract underlines Germany's desire to meet its carbon-emission targets, including reaching carbon neutrality by 2045, four years after the Qatar contract is due to end. It also means that Europe will remain a limited market for Gulf oil and gas.

While some spare oil production capacity is available in Saudi Arabia and the UAE, the same cannot be said for natural gas, at least not in the short run. Expanding gas supply

capability from the Gulf to alleviate a potential shortage in Europe will take time. Top LNG exporter Qatar is locked into long-term contracts, mostly with Asia, and will not have surplus gas for export at least until 2026. Even with the global energy transition accelerating, the demand for gas will paradoxically continue to increase across all continents, making it critical for future global energy security and the target of intense competition. Natural gas is still a fossil fuel but produces 50% less carbon dioxide emissions for power generation than coal and provides backup power supply for renewables. The Gulf is home to 25% of global gas reserves, yet contributes just slightly more than 8% of global supply, which leaves a sizable margin for future development. However, the near doubling of gas production by 2030 to meet growing demand could be challenging even for an LNG giant like Qatar.

Currently, Gulf nations are neither allies nor critical energy suppliers to Europe. Cooperation between the Gulf and Europe represents a good test case for both of their energy security strategies. Gulf monarchies are supporting Europe's efforts to decrease its dependence on Russian energy. To enhance their short-term energy security, European nations must engage with the world's richest oil and gas region, which may affect both parties' global climate mitigation efforts. The Gulf region's domestic carbon dioxide emissions account for merely 2.4% of the global total, but supplying the world with large quantities of oil and gas makes the region a huge exporter of carbon dioxide emissions. Thus, Europe's attempt to strengthen ties with Gulf exporters may send mixed signals about the former's commitment to decarbonization.

However, the greatest barriers to expanding energy relations between European and Gulf states are not technical or economic, but political and security-related. Until now, European states' foreign energy policies toward the Gulf have been primarily driven by ad hoc and short-term reactions to geopolitical events, not by far-reaching and comprehensive strategies. Middle East oil and gas suppliers, including the Gulf exporters, have not been considered entirely reliable partners by Europe. Thus, unlike Asian importers, European customers were reluctant to pursue long-term deals. Now, not only do the Gulf nations' strategic, long-term priorities lie with Asia, but oil and gas alliances with Russia complicate the Europeanization of their foreign energy policies. The Gas Exporting Countries Forum, which is headquartered in Doha, includes Russia. And three of the Gulf states are OPEC members, while OPEC+ includes Bahrain and Oman, along with Russia. Gulf-Russia geopolitical and geoeconomic ties have not always been linear, but they have often remained on the same side when energy interests are concerned.

The global energy supply has so far remained uninterrupted. However, a prolonged conflict in the Middle East would mean more disruptive attacks on energy and transport infrastructure, whether by Iran's naval forces, its proxies or other state and nonstate actors. The security of maritime choke points, such as the Strait of Hormuz, Bab el-Mandeb Strait and the Suez Canal, is more fragile than ever. Altogether, around 25% of crude cargoes and 20% of LNG cargoes pass through the Strait of Hormuz. The Iranian navy periodically attacks or seizes commercial ships and oil tankers in the Arabian Gulf, while Iran-aligned militias attack Gulf energy production facilities. Rockets launched on Saudi Aramco facilities in 2019 and ADNOC facilities in 2022 are examples of such attacks. Iranian forces have also recently seized European tankers off Oman's coast. The conflict between Israel and Hamas and the exchange of missile attacks between Israel and Iran have further escalated insecurity in the region. These threats not only drive up the time, but also the costs of shipping oil and LNG. Strengthening energy ties with the Gulf suppliers will force Europe to be involved in the region's highly complex and risky geopolitics. Already occupied with the Russia-Ukraine war, European states would want to avoid even indirect involvement in the region's conflictual dynamics.

If Europe has learned anything from the repercussions of Russia's aggression, it is undoubtedly that excessive dependence on energy sourced from a single country is risky. Although the U.S. has met Europe's immediate supply needs since the outbreak of the war, and they are part of a broader geopolitical, security and economic alliance, it is still dependence on a single supplier. In 2023, the U.S. exported more than 90 million tons of LNG (which was more than Qatar or Australia), up to 70% of which went to Europe. Since 2022, the U.S. has supplied Europe three times as much LNG as the next largest supplier.

Europe's safest source of energy is what it produces itself. However, it has limited capability to meet its energy needs from domestic sources alone, particularly for oil and gas. Europe's energy import diversification efforts and the Gulf suppliers' interests in expanding energy partnerships present opportunities for both sides, but it is unlikely that the Gulf will become a major supplier of oil and LNG and, by extension, a key guarantor of Europe's energy security. The Gulf's strategic interests lie with Asia and will remain so for the foreseeable future. That said, Gulf oil and gas producers are well positioned to become important energy suppliers to Europe, thus contributing to its energy import diversification. Expanding energy ties beyond oil and gas imports through collaboration on energy efficiency, renewable energy and hydrogen development can also build reliable, long-term partnerships between the Gulf and Europe.

The Gulf states do not always act on energy issues as a bloc. The EU member states' energy strategies are not always aligned either. Thus, energy cooperation would largely have to be carried out from both sides on a country-by-country and case-by-case basis. Bahrain, Saudi Arabia and the UAE are arguably among the Gulf countries that present more benefits than concerns for potential European partners. Human rights issues may place Kuwait, Oman and Qatar on a list of troublesome Gulf partners. In turn, Gulf exporters have a longer legacy of energy cooperation with some European nations than others. Thus, a more secure strategy for the Gulf exporters and European customers would be to consider energy and trade opportunities through both the GCC regional framework and bilateral formats outside the framework of a formal strategic partnership. □

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Women march in commemoration of International Women's Day 2024 in Bogotá, Colombia, on March 8 calling for equality, justice and an end to violence against women. REUTERS

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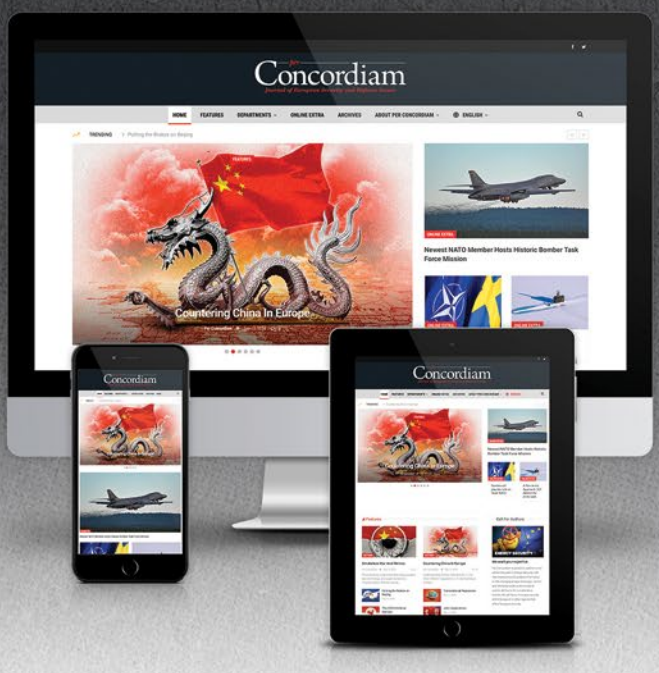

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