The Payne Institute for Public Policy
AT COLORADO SCHOOL OF MINES

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Variety is Not Enough. Why Can Diversification No Longer Guarantee Energy Security?

Commentary by Andrei Covatariu and Morgan Bazilian

Winston Churchill once stated that "safety and certainty in oil lie in variety and variety alone." Diversification, in other words, was energy security. That insight—framed when the British Navy shifted from coal to imported oil—marked the emergence of modern energy geopolitics and the weaponization of fuel supplies. But it was the oil shocks of the 1970s that put "energy security" into the minds of policymakers, embedding ideas like diversification and strategic stocks at the core of national strategy.

From Davos to the Munich Security Conference, energy has, once again, been discussed less as a commodity and more as a component of industrial and geopolitical power. It increasingly appears not as a standalone sector but as an enabler of supply chains, technological leadership, and strategic autonomy. In this environment, the meaning of energy security extends beyond fuel diversification to encompass broader questions of economic resilience and systemic stability.

Half a century after the first oil shock, diversification still matters and is often invoked — these days by the International Energy Agency — but it is no longer sufficient. The concept of energy security has become so complex that what looks like an improvement in one dimension can quietly generate new vulnerabilities elsewhere. The continuously changing energy security concept is now based on at least three layers, all of them shaped by a set of cross-cutting forces.

Three layers, one system

The first layer is domestic resources. For most of human history, energy security meant having enough local biomass, water, coal, oil, or gas to power homes, industry, and transport. Today, that logic still underpins countries with large fossil or natural endowments: the United States' shale boom lowered import dependence; Norway's hydro and offshore resources fund a generous welfare state; China's coal reserves still anchor its power system. And the phrase "independence" remains hopelessly attractive politically.

However, this layer is not simply about natural potential and geology. It depends on infrastructure quality, institutions, demand, and social stability. A country can sit on vast gas reserves and still face blackouts if pipelines leak, grids are outdated, or governance is weak. Environmental constraints—droughts that empty reservoirs, heat waves that strain grids—now directly shape the reliability of domestic supply, even if they are not always in political favor.

The second layer is interdependence through trade. As oil tankers, pipelines, and global and regional commodity markets spread in the 20th century, energy security increasingly depended on managing cross-border flows. This is the realm of OPEC decisions, LNG contracts, pipeline politics, and maritime chokepoints. It is also where energy became an explicit geopolitical weapon.

Europe's experience with Russian gas is the starkest recent example. For decades, pipeline interdependence was framed as mutual benefit; after Russia's full-scale invasion of Ukraine, it morphed overnight into leverage and coercion. European states scrambled to re-route supplies via LNG, accelerate renewables, and cap prices. On paper, they succeeded: storages were filled, lights stayed on, and diversification away from a single supplier advanced. Yet these same moves increased exposure to volatile global LNG markets and raised costs for households and industry, feeding domestic political tensions.

The third layer is clean technologies and critical raw materials. As countries pursue climate goals and various energy futures, they are building systems that depend less on traded fossil fuels and more on mining, processing, and manufacturing chains for critical raw materials (CRMs) and clean tech.

Solar panels, wind turbines, batteries, electrolysers, grids, and data-center hardware all rely on materials such as lithium, cobalt, nickel, copper, and rare earths, as well as on the digital components and software that enable flexible, decarbonized systems. These supply chains are highly concentrated, with China dominating mining, refining, or manufacturing stages.

In theory, a world powered by local sun and wind could resemble the first layer—energy produced close to where it is consumed. In practice, getting there pushes us deeper into a new phase of resource competition and energy geopolitics.

The forces that pull in different directions

Across these three layers, multiple drivers now shape energy security simultaneously: affordability, demand patterns, trading rules, technological change, social and political dynamics, economic and financial conditions, environmental stresses, or hybrid threats such as cyberattacks and disinformation.

This is where paradoxes emerge. Lower energy demand, for instance, usually improves energy security: less fuel to import, fewer bottlenecks, smaller exposure to price spikes. But if that demand reduction stems from recession or industrial decline, the longer-term effect can be the opposite. Economic stagnation erodes the fiscal space and political consensus needed to

invest in resilient infrastructure or diversification. What looked like a gain in energy security—lower consumption—turns out to be a symptom of deeper fragility.

The COVID-19 pandemic offers another uncomfortable example. Global lockdowns temporarily cut emissions and eased pressure on fuel supply chains; some grids coped more easily with lower demand. By a narrow, short-term reading, this alleviated stress on the first and second layers. Yet this "respiro" came at the cost of lives, livelihoods, disrupted supply chains, and massive fiscal outlays—undermining both the economic and social foundations of long-term energy security.

The same logic applies to today's race for critical minerals. Building domestic supply chains for lithium, copper, or rare earths can reduce dependence on any single supplier. But if done without regard for environmental standards, local communities, or financial prudence, it may ignite social unrest, legal battles, or stranded assets. Again, an apparent improvement in the third layer can degrade the very political and economic stability that all three layers rely on.

Hybrid threats further complicate the picture. A gas pipeline, a high-voltage substation, or a data center supporting grid operations can all be targeted physically or through cyberattacks. Supply chains for things like transformers – or even gas turbines – have multiple chokepoints and significant delays. Disinformation campaigns can undermine public support for critical infrastructure—whether a new LNG terminal, a transmission line, or a wind farm—turning social acceptance into a tangible constraint on energy security.

From static definitions to dynamic trade-offs

The traditional precept of "diversify and build up stocks" remains relevant; however, it is no longer sufficient. A country might proudly reduce imports while quietly increasing dependence on a single foreign supplier for solar panels or batteries. A push for energy efficiency might be delayed because high interest rates and regulatory uncertainty scare off investment.

Energy security is not, and has never been, a static state to be achieved — it is not a destination. It is a moving balance among layers and drivers, full of trade-offs, uncertainty, and time lags. Policies that strengthen one dimension can weaken another; shocks in one part of the system echo across the rest.

For decision-makers, the implication is clear: they need frameworks and metrics that reflect this layered reality – and a healthy dose of humility. That means looking beyond simple indicators—such as import dependence or reserve-to-production ratios—and instead assessing how domestic resources, traded fuels, and clean-tech supply chains interact with social, economic, environmental, and security trends over time.

Churchill's intuition about variety remains right. However, in an era of contested energy futures, variety must be understood not just as having multiple suppliers of a single fuel, but as building resilience across all three layers of energy security—and across the many forces that now shape them.

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Andrei Covatariu is Brussels-based energy and climate change expert, focusing on the energy transition process and its geopolitical, economic, and social challenges. He holds multiple roles, working at the intersection of theoreticians (think tanks, academia) and practitioners (energy industry, international organizations, domestic goverments), engaging with both private and public stakeholders across Europe, the Middle East, and the United States. Andrei's views and policy analyses are constantly published and cited in international media.

Andrei is a Nonresident Senior Fellow at the Atlantic Council, a Member of the Energy Advisory Committee at GLOBSEC, an Affiliate of the Middle East Institute, a Senior Research Associate at Energy Policy Group, and Director of Energy and Climate Mitigation at the Climate and Water Initiative, where he contributes to research and discussions on energy security, geopolitics, and the evolving regulatory and energy policy landscapes. He is also an Associate Lecturer at the Bucharest University of Economic Studies.

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