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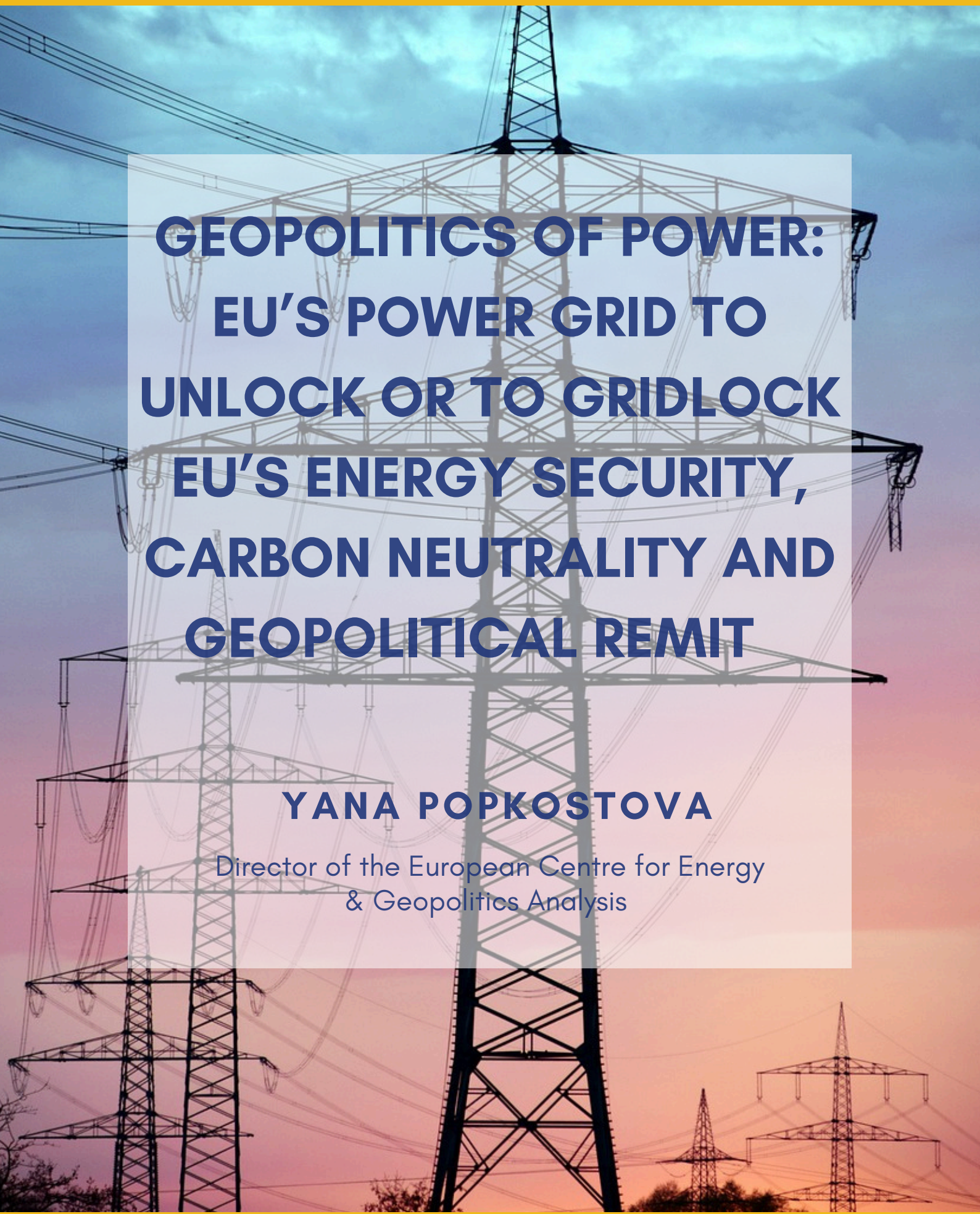

GEOPOLITICS OF POWER: EU'S POWER GRID TO UNLOCK OR TO GRIDLOCK EU'S ENERGY SECURITY, CARBON NEUTRALITY AND GEOPOLITICAL REMIT

YANA POPKOSTOVA

Director of the European Centre for Energy & Geopolitics Analysis

By Yana Popkostova,
Director of the European Centre for Energy & Geopolitics Analysis

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The author is the director of the European Centre for Energy and Geopolitical analysis. She is the co-author of IRENA's flagship report Geopolitics of the Energy Transformation: Energy Security, and a co-lead of the UNDP Critical Raw Materials Advisory Group. The views expressed are the author's own.

Electrification, along with its implications for energy generation and critical infrastructure, is reshaping European energy systems and geopolitics. In the wake of the recent energy crisis, and the multitude of measures governments across the continent took to shield industry and households against its debilitating consequences, the debate around the most efficient way to achieve sustainability and competitiveness is heating up and would likely constitute a fundamental anchor for the next legislature. At the centre of this endeavour should be the thinking around interconnections – pan-European and across Member states, but also transcontinental, amongst regions and territories. As the European institutions renew this autumn, the dusty Energy Union ambition for well-integrated electricity infrastructure and markets should be resuscitated: with investment and commitment clearly backing the grid expansion and modernisation, as well as governance adjustments ensuring the smooth operation of synchronised power markets.

No transition without transmission

The above oft-pronounced refrain stands today as the key to unlocking both energy security and environmental benefits for the European Union. Three main factors warrant the need for better interconnected and modern power grid infrastructure across and beyond the European Union: the decarbonisation trajectory, the combined risks of extreme weather, cyber and kinetic disruption of electricity flows, as well as the changing power demand optics. A robust EU Super grid would also bolster EU's strategic autonomy and geopolitical remit.

Decarbonisation's key lever is electrification with electricity consumption in the EU projected to increase by almost 60 percent by the end of the decade. As per REPowerEU dictums, the share of renewable energy would almost double to 42,5 percent, translating to a colossal 700GW of new solar and wind capacity by 2030. The scale of the challenge cannot be achieved without upgrading the European transmission and distribution system.

Better integrated pan-European electricity network would allow for optimal siting of renewable generation capacity, continental scale resource adequacy assessments, and peak load and congestion management. Interconnections would also balance baseload and flexibility capacity across the continent and thus alleviate the challenge of intermittency. Most importantly, a well-interconnected and modern grid would facilitate the activation of large-scale demand side management to avoid congestion or scarcity: a key factor for ensuring energy security. The cost and efficiency premium is substantial: analysis by ACER demonstrate a 34-billion-euro savings of an integrated system compared to a counterfactual case; while baseload and flexibility costs deflate by 20 percent. Given that most baseload capacity is fossil-fuel based, interconnectedness would also yield emissions benefits and capitalise on the low wind power correlation across the continent. Next to the direct cost advantages, interconnected systems will facilitate synchronous market integration, and thus foster competition, compelling market participants to seek efficiencies. The reliable flow of clean electrons would also constitute a fundamental lever for the Net-Zero Industry Valleys, where breakthrough innovation would emerge. This all would benefit European competitiveness, public finances and climate goals: in a macroeconomic environment under duress, with high interest rates and high-capex clean energy projects - a non-negligeable advantage.

In addition, in the face of a host of hybrid threats - from climate-driven, to cyber and kinetic disruption, that present a consequential concern for highly electrified and digitalised systems, segmented energy systems would experience a much more acute shock than integrated ones, imposing interconnections also as a security guarantor. At the peak of the energy crisis in Europe in 2022, France, an electricity exporter, reversed track seamlessly to overcome the domestic shortages. In the face of supply-driven external disruption, interconnectedness provides the most security[1].

Finally, the changing demand and supply patterns would impose significant stress on the grid. From integrating more distributed sources, to accounting for the pressures of migratory power demand, where energy gluttonous and non-location anchored data centres, cryptocurrency miners and generative AI pursue the cheapest power on a real-time basis, interconnectedness would become fundamental for the energy system resilience.

Ultimately, the unrelenting concern with variability and avoiding fossil-fuel based backup capacity will change the optics of external relations and pivot electricity markets to more regional basis. Trans-continental links to receive clean energy from Asia and Africa are being elaborated: the Green bridge with Azerbaijan or the interconnector with Morocco. Globally, electricity trade will attain 8 trillion Kwh by 2030. The upscaling of the use of (U)HVDC technology in the years to come will have serious implications on geopolitics that could be conducive to peace and security if the right initiatives are put in place.

Future conundrums

Achieving the potential of integrated electricity markets would demand bold regulatory choices, mainly related to releasing domestic control, and assuring the investment, skills and manufacturing capacity to modernise existing and build new interconnections within and beyond the EU.

[1] The gas price gyrations coupled with drought induced hydro and nuclear power outages amidst the Ukraine war inflated European power prices to unprecedented levels. Mandates to secure alternative gas supplies, bolster LNG regasification capacity and splash subsidies to utilities and consumers alike to avert the economic and social impacts of market scarcity were quickly enacted. These combined with benevolent weather and timid demand in competing markets proved fortuitous. But the key to EU's collective resilience to what history would define as an unprecedented systemic shock was the internal energy market and the interconnections between Member states. For the EU Energy crisis conundrum, consult the author's publication.

More than half of the 11 million kilometres of existing grids would be 40 years old by 2030; permitting is still plagued by bureaucratic and regulatory barriers and Nymby opposition; and the supply chain for the materials needed to lay the cables increasingly complex and beset by geopolitical connotations. EC analysis show that €584 billion need to be spent on electricity distribution grids by the end of the decade, yet there is no targeted investment vehicle created to this end, with financing streams complex to decipher and spread across multiple mechanisms: from the Cohesion funds to the Recovery and Resiliency Facility. Manufacturing limitations, especially for sub-marine cable manufacturing globally, and a chronic lack of the specific labour force necessary to lay cables and wires compound the challenge.

In addition, the current system of spread-out national measures with a lever of opacity as per incumbents' power and natural monopolies blights attempts to harmonise the system. This could stoke fragmentation, amplify deep political and solidarity rifts, and ultimately impede the achievement of the synchronous and integrated power markets ambition.

The excessive concentration of production and refining capacity for the materials and components needed to upgrade the electricity network are also consequential. As electrification engulfs the world, a massive rush to procure aluminium, steel, nickel and critically copper, the metals that are key for the wires, cables and transformers that underpin electrification would occur. And as the IEA latest CRM outlook suggests, the supply chains for those remain excessively concentrated, with China for instance processing close to two thirds of all copper.

Solving these challenges would be a task of tall order. A robust governance framework would need to be enacted that provides certainty to market participants, and do not depend on the vagaries of political priorities. Coordination needs to be reinforced to enable investment in critical technologies - from grid enhancement to flexibility and hybrid meshed grid technologies, and to seamlessly plan and redirect electrons across systems. Bolstering the oversight mandate of ACER to this end and to foster the 15 percent inter-country transmission capacity target is warranted. The Agency could also host a platform where governments, utility companies and system operators cooperate to avert outages and enhance the operational effectiveness of the network to hybrid threats.

With non-EU partners, risk and cost sharing mechanisms would need to be elaborated. Harmonisation in terms of grid connection codes, as well as collective tackling of materials supply chain resilience, harmonised grid planning and components procurement, and bolstering knowledge exchange on and collective resilience to natural or man-made shocks would become essential to foster grid reliability and stress-test power exchange.

A dedicated public funding stream has to be created for grid enhancement with the existing CEF significantly bolstered. Novel mechanisms that allow importing Member states to share costs related to clean energy generation and export capacity additions in exporters should be elaborated. A serious discussion around a new collective public debt issuance for the grid network given the enormity of the challenge and its importance for the EU net-zero growth trajectory is warranted.

Relinquishing sovereign control solemnly guaranteed by TFEU Art 194 might make domestic utilities less competitive, induce social discontent where subsidised electricity flows to neighbours, or compromise industrial advantages in the short term. Yet, a future-proof energy system would increasingly be defined by capacity to insulate operations and service-delivery against geopolitical, cyber or extreme-weather shocks. An interconnected grid in this context provides more reliability and resilience and bolsters the energy security of all Member states together in the long run. The Council conclusions on Sustainable electricity grid from 30 May seem to gravitate to such realisation; a robust political pronouncement that now needs to translate to concrete measures. The above ideas might merit consideration as the EU continues to grapple with its needs for power.

Way forward: Energy security and grid resilience

Cultivating energy system resilience in a decarbonised and electrified environment would require bold choices and a radical upheaval of the energy market: embracing more integration, releasing some sovereign control, and thinking around solidarity and competitiveness on pan-European rather than national terms. This would also force energy and climate diplomacy to be premised more on cooperation and integration with neighbours and exporters of green molecules.

Emphasising the decarbonisation and competitiveness mantra, while complacently ignoring the key conduit for achieving them has already been revealed as myopic. The key question before returning and freshly appointed decision-makers this autumn should be - where would Europe stand emissions-, competitiveness- and geopolitically-wise in 2030 if it has not built a modern and well-integrated grid. The response to this query might prompt massive and concerted action.

The vaulting ambition of climate neutrality can only be achieved by redefining the scope of energy security going forward and placing the necessary weight on the grid. In the absence of modernised, interconnected and agile electricity network across and beyond the EU, the achievement of the RePowerEU, the Net-zero Industry Act or the Green Deal would falter. Grid modernisation and expansion is a sine quo non condition for EU's energy security, climate neutrality and geopolitical resilience.