

Energy

Policy and Strategy



RAMBOLL

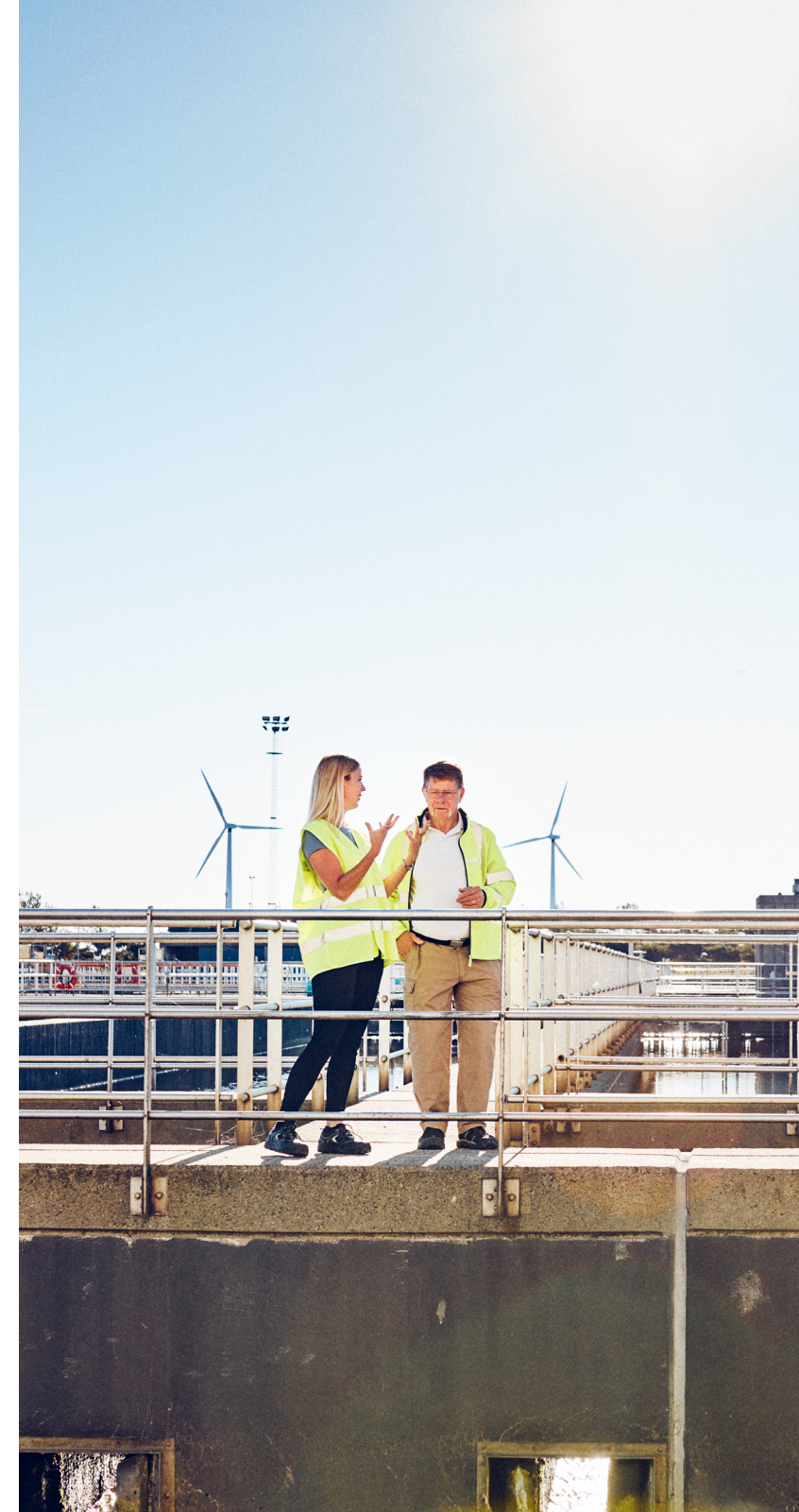
Learning from the EU energy crisis

The European Union's (EU) energy markets have been in turmoil during the last few years, straining imbalances between the societal goals of energy security, sustainability, and affordability - the "energy trilemma". A perfect storm of geo-political factors created unprecedented price jumps in the gas markets, subsequently increasing energy poverty across the EU, and leading public authorities to warn of brownouts. What lessons can this crisis give us in the developing policy discussions on the green transition? What can revisiting an analysis of the energy trilemma in Europe show us in light of the continent's current energy position?

In the autumn of 2022, the looming threat of an energy crisis cast a long shadow over the EU, brought on by heightened global instability in the wake of Russia's invasion of Ukraine. In a rapidly developing crisis, the EU's reliance on Russian gas imports made it especially vulnerable - highlighting the inescapable geopolitical constraints placed on EU energy policy. Although the severity of an impending energy crisis appeared uncertain, subject to the intensity of the approaching winter, cracks in the EU and Member States' energy security strategy emerged.

While the crisis adversely affected many Europeans, a worst-case scenario was avoided in the region through a combination of a milder winter, energy-saving campaigns, and sizable

liquefied natural gas (LNG) purchases from the Middle East and the US - replacing much diminished piped gas imports from Russia. In the autumn of 2023, the EU Energy Commissioner stated that the EU energy market rested on a more stable platform for the coming winter than it did one year earlier - a consequence of strategic measures enacted at the EU level. A renewed, albeit belated, focus on energy security is vital for the green transition to succeed. Energy security must be incorporated into a robust strategy that 1) does not repeat past dependencies on fossil fuels or geopolitical circumstances, 2) combines long- and short-term perspectives, and 3) can balance against the needs of affordability and sustainability.



The energy trilemma defines the robustness of Europe's energy system

Like most policy decisions, decisions relating to energy do not occur in a vacuum.



Climatic change



Biodiversity loss



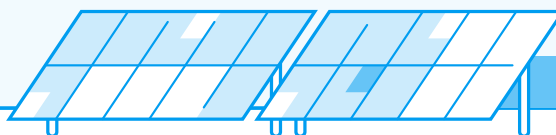
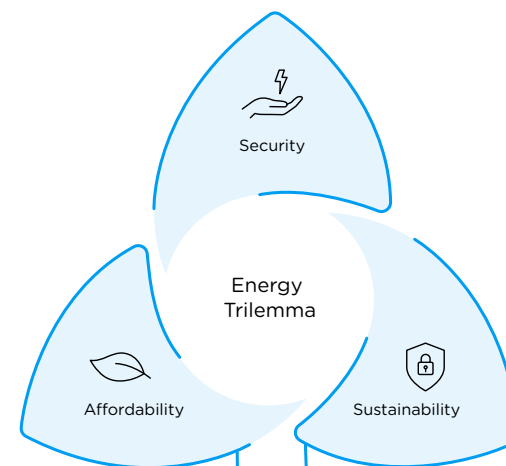
Geopolitical instability

are subverting many traditional paradigms relating to energy planning and policy, such that the current strategic environment for decision-makers can be seen to exist in a trilemma – a trade-off between affordability, sustainability, and security.

In March 2023, the Nordic Council of Ministers, with Ramboll's assistance, published The Nordic Energy Trilemma report, highlighting challenges to delivering a secure, affordable, and sustainable energy transition.

This partnership with Ramboll established that specific drivers need addressing to prepare a country or region for energy-intensive seasons to avoid the instability that can be caused by severe uncontrollable shocks to the energy system.

While tailored to winters in the Nordic context, the report's methodology provides a useful framework through which to broadly assess current and long-term EU policy trends for energy security in the EU.



Energy security has been ensured but through reactive policies

Historically, the EU has relied on energy imports to keep citizens warm and the economy running. Before the Russian invasion of Ukraine in 2022, the EU imported a record 60 percent (2019) of its energy (consumption) needs, representing an energy trade deficit of approximately 250 billion EUR. Tightly bound to global energy markets due to a lack of traditional energy sources, the EU gradually found its energy security tethered to Russia, its largest coal, oil, and gas supplier.

The benefit of this relationship was seen as twofold – the reciprocal tethering – and ‘taming’ – of Russia to the global energy markets through economic forces, and imports of affordable gas and oil for use in the EU. Had Russia not invaded Ukraine, this positive relationship would have invariably continued. Instead, Russia markedly curtailed its exports of vital fuels while the EU sanctioned Russian aggression, resulting in soaring energy prices in the bloc and prompting an urgent reassessment of the EU’s energy strategy. The result was a breakdown of the security of demand for Russia and the security of supply for the EU.

Recognising the severity of the crisis, the EU’s leaders moved diversity of energy resources and suppliers to the top of their agenda, aiming to fortify the region’s energy security. Initiatives were taken from the local to the EU level, with the latter enacting successive sanction packages and strategic initiatives to wean itself off Russian energy resources. The EU Commission is not the sole actor affecting outcomes – member state governments enacted national policies as well. Scrutiny is especially relevant as not all policies enacted to ensure energy security focused on long-term objectives. For example, to substitute the reduced imports of Russian pipeline gas, Germany extended coal-fired power stations, alongside diverting significant amounts of capital into LNG import facilities rather than renewable energy, increasing risks of stranded assets or path dependency. Furthermore, sudden political interventions in energy markets carried out by several member states reduced long-term trust in market functions and increased political risks for market players when considering future investments.

¹ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:EU_energy_mix_and_import_dependency#Energy_mix_and_import_dependency

² <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20220210-3>

³ <https://www.powermag.com/germany-restarts-coal-fired-generation-to-support-winter-power-supply/>

⁴ <https://ieefa.org/articles/europes-lng-capacity-buildout-outpaces-demand>

⁵ <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230925-1>

⁶ <https://ec.europa.eu/eurostat/documents/4187653/16179944/imports-energy-product-partner-q2-2023+%281%29.png/cacead36-f03f-94b2-2d1b-726e887fcfb2?t=1695394346229>



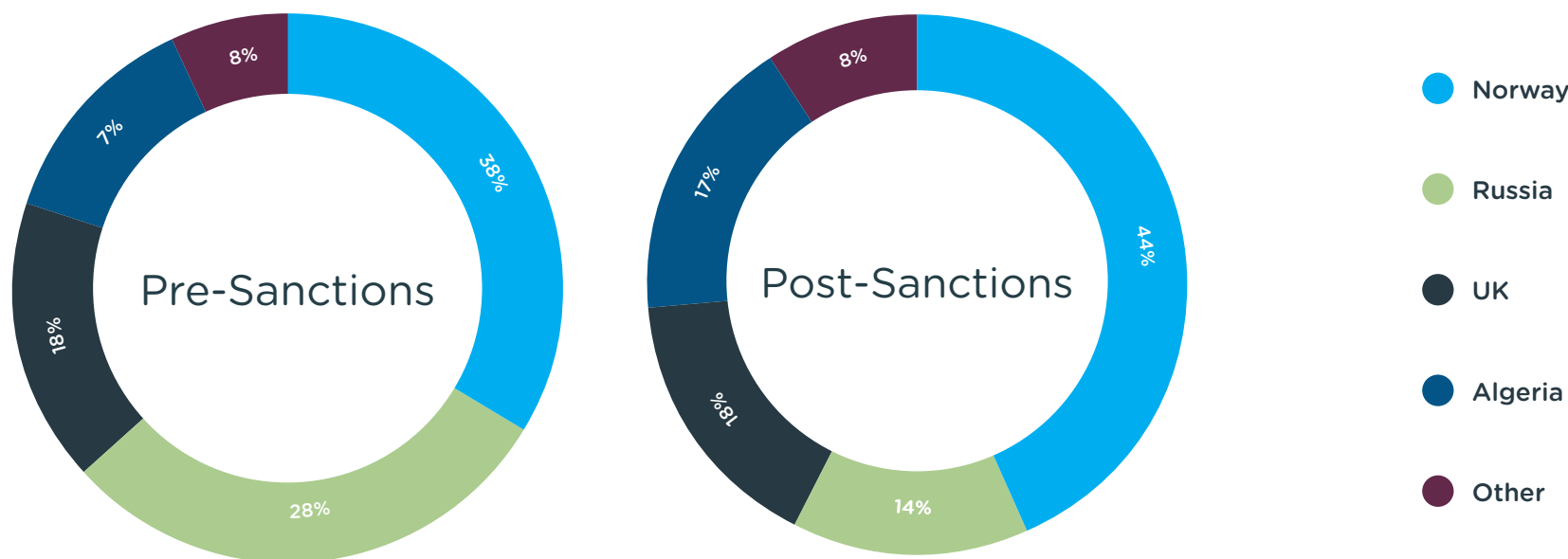
Energy imports have been dominated by too few for too long .

There have been some significant changes to the EU's energy suppliers since Russia invaded Ukraine. The most tangible change was observed in the significant reduction of EU imports of Russian gas via pipeline. In the second quarter of 2022, pre-sanctions, Russia held the position of being the second largest

supplier to the EU of pipeline gas, accounting for approximately 28 percent of the value share. Within 12 months after sanctions and import reductions, this share had fallen to around 14 percent, see Figure 1. It is worth noting that the actual amount is likely higher due to indirect imports, which could prove difficult to reduce

further if a long-term strategy is not implemented. The displacement of Russian pipeline gas has largely benefited Algeria and Norway, which now have even more dominant market positions.

Significant changes in the composition of piped gas imports into the EU, % share of value



Furthermore, using the Concentration Ratio 4 (CR4 – a typical measure of market concentration), the four largest import partners for the EU for petroleum products, natural gas (by pipeline), liquefied natural gas, and coal were in Q2, 2022, all close to or above the 50 percent threshold used to indicate a highly concentrated market, see Figure 2.

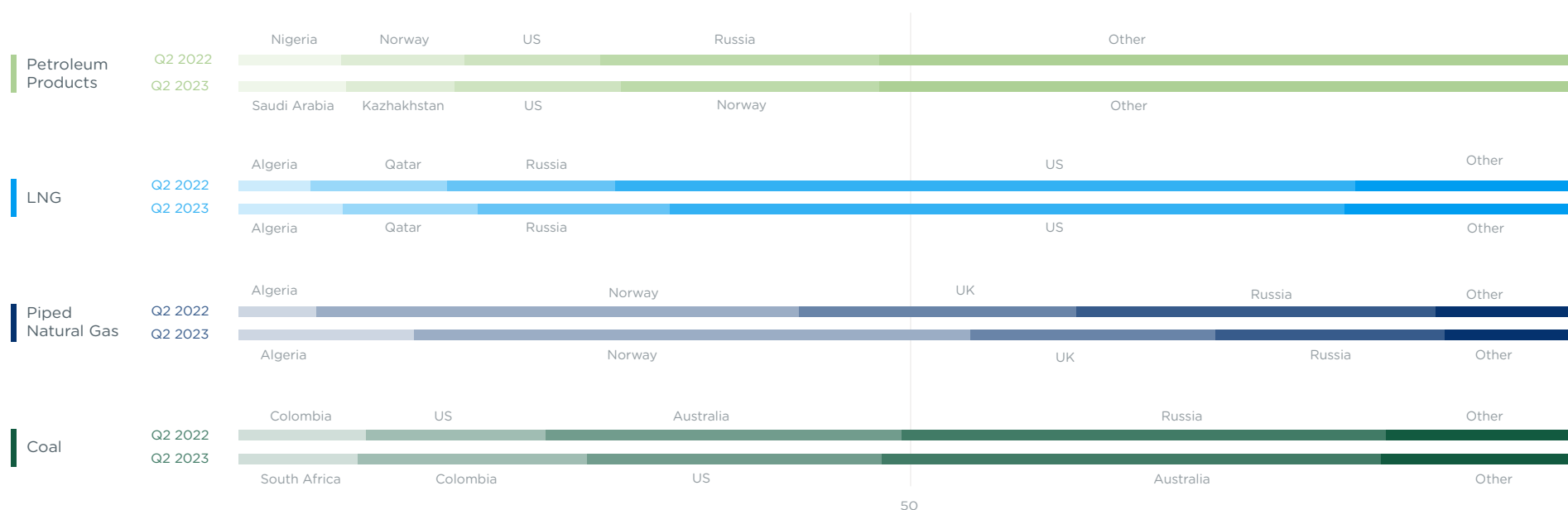
While reliance on Russian energy supply was reduced over the following 12 months to Q2 2023, the high market concentration remained relatively unchanged over the same period for petroleum products, piped

natural gas, and coal, suggesting that reliance has simply shifted to other alternative suppliers.

Although CR4 indicators are unable to capture the intricacies of geopolitical landscapes and energy market interdependencies, high market shares for individual countries should be seen to be worrying. At their core, they suggest considerable political leverage for countries that have high market shares, especially as alternatives in global energy markets are squeezed. Absolute changes in imports of energy products can alter the CR4 relationship as well. In Figure 3, import

volumes of petroleum products have remained relatively unchanged between 2021 and 2023, whereas coal and piped natural gas have both decreased in absolute amounts. The absolute amount of LNG imports has increased by approximately 100 percent between 2021 and 2023, with LNG imports spiking in Q2 2023. Consequently, even though the CR4 remains relatively unchanged from Q2 2022 to Q2 2023, the higher import of LNG suggests increased reliance on the four largest sources of LNG relative to the other fossil energy sources.

Figure 2: CR4 ratios of direct import sources show high import dependency on a few sources , Q2 2023



⁷<https://www.reuters.com/business/energy/norway-may-tax-power-exports-keep-domestic-prices-down-2023-02-15/>

⁸ <https://www.whitecase.com/insight-alert/australian-federal-government-publishes-proposed-east-coast-gas-market-code-conduct>

⁹ <https://www.atlanticcouncil.org/blogs/new-atlanticist/what-to-make-of-chinas-latest-restrictions-on-critical-mineral-exports/>

¹⁰ <https://www.foreignaffairs.com/europe/missed-opportunity-energy-crisis-fossil-fuels>

¹¹ https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1142

Given the above trends, greater emphasis on diversification is still needed. The critical nature of diversification was highlighted midway through the crisis, where Norway experienced a very public debate around withholding electricity from the wider European energy market – which would in effect have increased competition for energy imports, driving up prices further. This debate was taken one step further in

Australia, a critical supplier of LNG globally, with the proposed introduction of a code of conduct for the gas market – in essence, forcing withholding of gas resources for domestic use. Finally, restrictions on critical mineral exports from China are also increasing pressure on the EU's ability to develop and maintain certain technologies necessary for the green transition. Although these policies can be argued to be vital from

a national perspective, the side effect is an increase in volatility and risks associated with energy imports on the global market. These sentiments were exacerbated by the increased prices for all fossil fuels, with the EU estimated to have paid between 517 to 831 billion euros to cover the increased cost of fossil fuels. Hence, the pursuit of diversification of the fossil fuel markets may not be enough to ensure future energy security.

Development of imported volumes indexed to Q1 2021



Diversification of energy production, carriers, and storage must be incentivised

In this global environment, a strategy of pure diversification of energy production is not enough. Rather, any strategy needs to provide incentives to diversify carriers and storage of energy in the long-term to balance the energy trilemma, and thereby avoid the need for reactive policies that can damage the climate, affordability, and long-term trust in functioning markets.

From a long-term energy security perspective, more consideration is needed to develop and dimension different types of short- and long-term energy storage solutions. Given that a recent survey of Europeans showed overwhelming support for continued investment in renewable generation, such a path towards an increasingly intermittent and weather-dependent energy system requires more investment in a diverse array of energy storage services alongside increased diversity of renewable services, irrespective of Russian aggression. Developing the hydrogen and biofuel infrastructure could be part of this solution, alongside leveraging the respective strengths of different technologies and energy carriers whilst developing local energy systems that help to limit excessive dependence on any single technology, facility, or supply route. The push to establish a synthetic energy storage network could help to increase the diversification in different parts of the European energy system and increase the continent's energy security given the need for strategic seasonal storage.

However, once again, this requires a substantially increased investment in renewable sources to be coordinated with a long-term approach to energy storage. A first step could be the establishment of an international or EU energy storage agreement, providing guidelines for appropriate storage levels considering national renewable energy targets and grid requirements.

For individual countries, greater responsibility for balancing supply and demand in terms of energy security must be incentivised and implemented nationally. As was made apparent after Russia's invasion of Ukraine, strategic energy reserves proved to be critical to ensuring enough warmth for Europeans over the winter. Although prices for the LNG and backdoor Russian gas that now feeds into these strategic reserves have fallen since the invasion, these fossil fuel markets continue to be more volatile with the limited pool of source countries available for energy import and heightening risks of nationalistic energy policies. Furthermore, with the newly minted LNG assets entering into operation in response to the crisis, there is a risk of stranded assets emerging, making it harder for individual EU Member states to justify investments into long-duration energy storage or strategic reserves fed by alternatives to LNG. With that said, continued exposure to volatile international fossil fuel markets still presents a need for strategic reserves of energy in storage that can be used independently of extra-EU geopolitical concerns.

¹² https://www.researchgate.net/publication/228249570_Energy_Security_and_the_Division_of_Competences_Between_the_European_Community_and_its_Member_States

¹³ <https://www.sciencedirect.com/science/article/abs/pii/S0301420723005032>



Balancing the energy trilemma in the long-term should not be compromised by the short-term

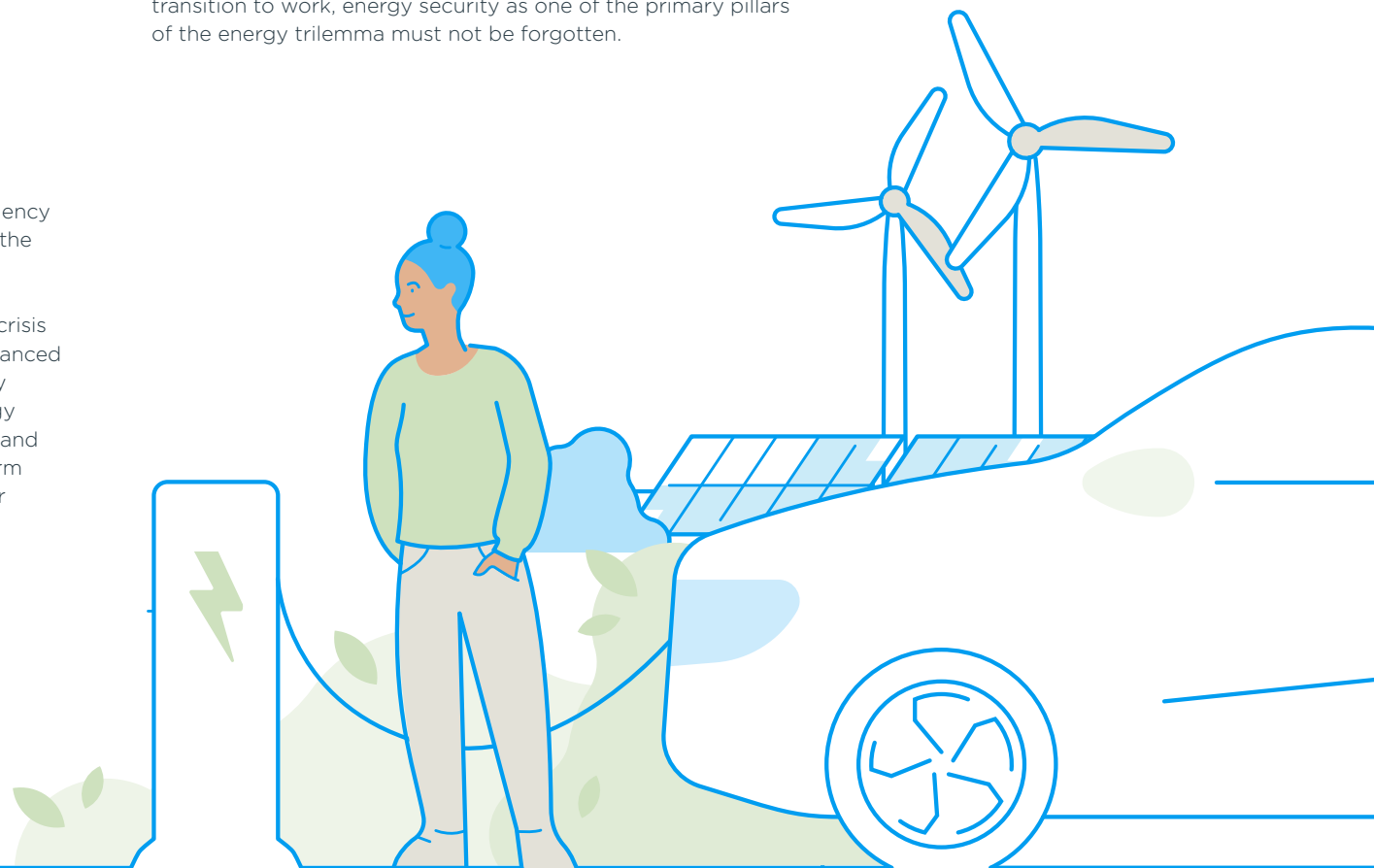
Beyond the continued shock of Russia's illegal invasion of Ukraine and the energy crisis that followed, balancing the energy trilemma is a goal that still makes sense. As part of this strategy, short-term crisis responses must not be allowed to derail or damage the balance, as the long-term effects can be severe. The three pillars of such a strategy can be seen as:

- thoroughly assessing future policies related to energy security on all aspects of the energy trilemma,
- diversifying energy sources, carriers, and storage infrastructure, and
- taking increased local responsibility for balancing supply and demand.

With timely preparation that provides robust buffers, short-term policies such as market price caps and emergency utilisation of fossil energy sources should not emerge as the best short-term solutions.

The Russian invasion of Ukraine and the ensuing energy crisis have urgently highlighted the crucial importance of a balanced approach to EU energy planning and to the bloc's energy system as a whole. A short-term focus on ensuring energy security through emergency investment in LNG facilities and storage has come at the expense of a broader, longer-term perspective on the energy trilemma. The EU and Member States are still exposed to future global energy shocks.

Alternatively, excessive emphasis on achieving long-term climate goals without due consideration for immediate security needs poses its own set of challenges, forcing member states to pursue suboptimal short-term policies when economic stress is applied. Recognising that the security of energy supply is a paramount concern both now and in the long-term, it is essential that energy planning, strategy, and policy are recalibrated to maintain a balance in the energy trilemma. For the green transition to work, energy security as one of the primary pillars of the energy trilemma must not be forgotten.



Bright
ideas.
Sustainable
change.

RAMBOLL