Independent Commodity Intelligence Services

Summary:

Global energy, petrochemical and fertilizer markets have faced major headwinds in the last four years and challenges may increase further in 2024. In this report, ICIS has teamed up with international consultancy New Normal to analyse five global risks, explaining why and how they could impact the three sectors and what measures could be taken to mitigate them.

INTRODUCTION

A wide range of threats to the global economy have been highlighted by international financial institutions, ranging from housing bubble busts and banking failures to extreme weather and cost-of-living crises.

For the energy, petrochemical and fertilizer sectors there are five specific risks which directly impact demand-supply balances and therefore pricing dynamics:

These include:

- The global economic outlook
- The specific outlook for China as the growth driver for these sectors
- The political and operational challenges created by implementing the energy transition
- Geopolitical risks
- Cyber attacks and threats to infrastructure.

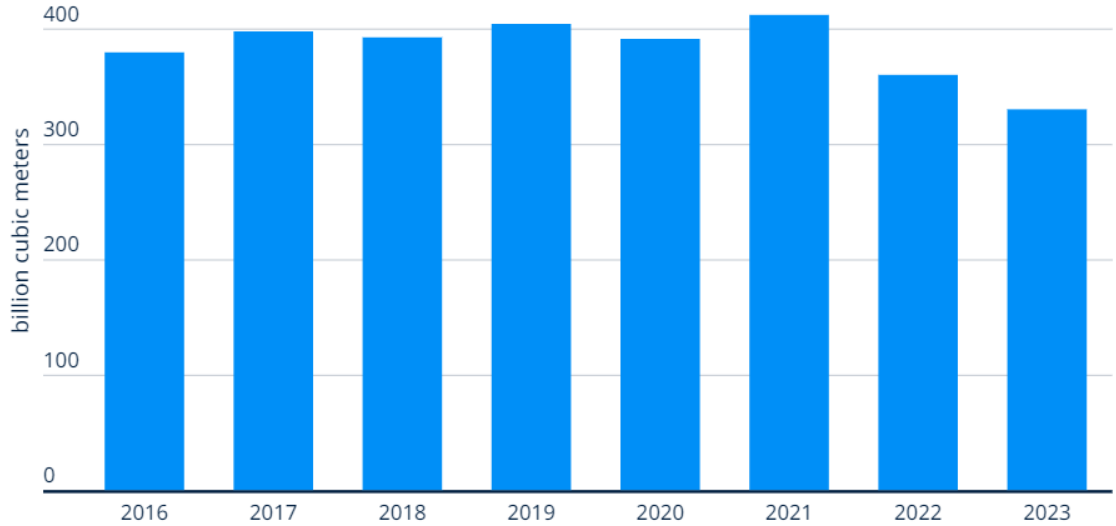
This year there is a heightened risk profile linked to rising global political instability and major supply chain and technology disruptions, rising demographic challenges and higher regulatory uncertainties.

Costs
Russia's invasion of Ukraine led to an unprecedented energy crisis in 2022. Russian producer Gazprom slashed natural gas exports to Europe by 90%, expecting to deflect western military and political support for Ukraine.

The war thus led to record natural gas prices around the world, as Europe scrambled to secure alternative volumes. These higher costs also had a major impact in other key areas such as fertilizers and petrochemicals.

In 2023, a 20% drop of 69 billion cubic metres (bcm) was recorded for European gas demand, below the 2017-2021 average, according to ICIS collated data. This is roughly equal to Germany's annual consumption (74bcm) in 2023. This was the biggest drop since ICIS started collecting data in 2013.

Annual European gas demand



SOURCE: ICIS

Although prices have since retracted the damage remains, shown by sluggish demand levels, while the outlook is equally subdued – and not just in Europe. The World Bank has again revised down its global GDP forecast to 2.4%, warning that the last five years will have seen the slowest half-decade of growth for 30 years.

In natural gas, China regained its position as world's top LNG importer in 2023 after the Covid-related fall in 2020. ICIS expects the country to maintain this position in 2024, with a 9% increase of imports likely.

China

Major risks are outlined for China, facing deep-seated structural problems including a shrinking population, a bursting housing bubble and rising debt.

In petrochemicals, the world now faces massive oversupply as China focuses on achieving self-sufficiency. No other market can replace lost Chinese demand.

While global warming and extreme weather make the energy transition more pressing, consumers, and therefore governments, are increasingly concerned by the costs of funding it.

The transition raises political and operational challenges for governments and companies. It is also a potential minefield due to the disruption created by the reshoring of global supply, the absence of technological standardisation and unpredictable regulation.

Geopolitics

Geopolitics brings concern with elections in more than 50 countries set for 2024, including eight of the largest economies. It is hard to overestimate the uncertainty this creates for the energy, petrochemical and fertilizer sectors.

Campaigns are already underway in many countries and the result of Argentina's recent election confirms that surprises are inevitable. The energy transition is already a key area to the debate.

Further obvious challenges include developments in Ukraine and the Middle East, which are facing hot wars, alongside the emergence of new tensions such as those in Latin America, where Venezuela is disputing territory in Guyana.

These issues are already impacting global supplies and creating maritime chokepoints, causing freight and insurance costs to rise.

Cyber attacks
In this environment, cyber or physical attacks against energy and petrochemical infrastructure as well as the agribusiness are likely to grow. Rogue states, and private actors, will no doubt be increasing their hacking of vital IT systems and deploy AI-produced deep fakes to fight hybrid wars or demand ransomware.

In this report we explain all five risks and offer recommendations to mitigate them.

1. MACROECONOMICS

The global economy is slowly recovering from the triple shocks experienced in the last four years - the pandemic, the energy crisis and Russia's invasion of Ukraine - but growth remains sluggish and uneven.

Headline inflation is set to nearly halve from 9.2% in 2022 to 4.8% in 2024. But this year is also expected to mark the slowest half-decade of growth for 30 years, according to the World Bank.

Several factors compound macroeconomic risks in 2024.

Population
Firstly, although according to US census data the global population is expected to increase by 0.95% in 2024 compared to 2023, nine out of the top ten economies responsible for two thirds of the global GDP are ageing.

Baby boomers (born 1946-70) are the main source of population growth in the world's top 10 economies but they are a replacement economy as they already own most of what they need and their income declines as they enter retirement.

This matters for the global economy because consumption is 60-70% of GDP in western economies and consumer spending peaks by age 55, before falling 30% or more by the age of 75.

Debt
Secondly, central bank stimulus programmes have left a further hurdle in the shape of record levels of global debt. The World Economic Forum estimated global debt at $310tn in 2023, nearly double 2008's level, which suggests an increasing risk of country/corporate defaults as the economy continues to slow.

Reducing these exploding debt levels in 2024 will be difficult. Tighter fiscal and monetary policies are likely to be unpopular with voters as they go to the polls.

Protectionism, technology
Today's slowing and over-indebted global economy also creates a third major risk, the pursuit of protectionism. China is providing major subsidies for manufacturing in an effort to try and replace jobs lost by the implosion of its property sector - which accounted for 29% of GDP at its peak in 2019

Inevitably, this is set to lead the US and EU to respond with their own subsidies and support for local jobs.

Fourthly, technology has changed our world over the past 30 years in ways that are not always apparent. It has led to major productivity gains for companies, as consumers now do much of the work themselves - from booking travel to checking out in supermarkets.

Emerging technologies such as artificial intelligence and the automation of certain economic sectors risk increasing unemployment.

Regulation
Regulatory uncertainty is also set to increase. The new factor today is the growing impact of unelected pressure groups on policy - both those claiming to represent industry and those claiming to represent consumers and the general public.

Major sectors such as electricity and natural gas may also see tighter regulation, as governments seek to protect voters from utility costs.

<u>IMPACT ON ENERGY</u>
In 2024, global gas demand may see some recovery. Global energy and petrochemicals data provider ICIS forecasts a 5% year on year rise, driven by China and Japan. However, Germany, Europe's growth engine in recent decades, is set to experience a 0.6% GDP decline. Its business model based on cheap imports of natural gas from Russia and rising export volumes to China, is now under threat at both ends of the value chain.

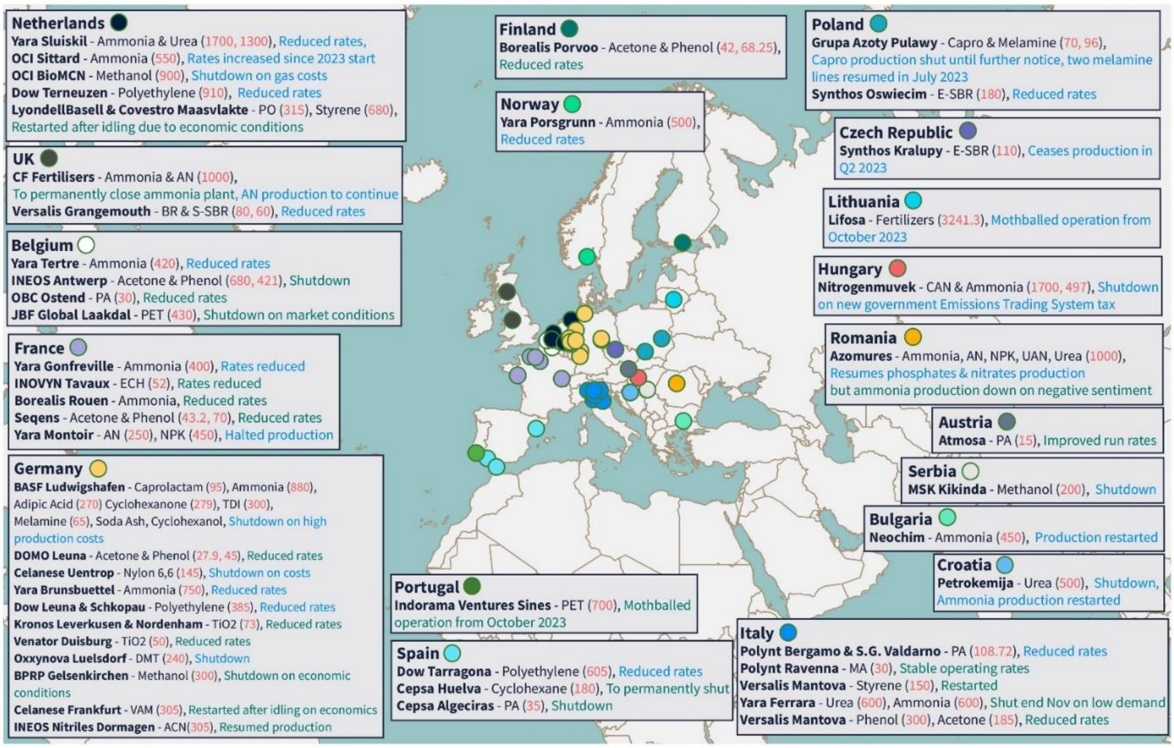
<u>IMPACT ON PETCHEMS</u>
The sector is suffering from major overcapacity, with ICIS data estimating it has already reached 200 million tonnes in the six major petrochemical value chains, with another 50 million tonnes expected by 2030. In turn, producers are already well on the way to losing pricing power.

<u>IMPACT ON FERTILIZERS</u>
Global urea and ammonia prices are likely to continue to come under downward pressure in 2024 due to a general lack of demand amid ample supply.

Lower crop prices, the rising cost of financing for farmers, currency volatility, higher freight costs and an uptick in domestic capacity in some regions are all expected to keep demand thin. Ammonia producers are expected to focus more on contract shipments at the beginning of 2024.

European chemical & fertilizer production impacted by gas costs, low demand

Rates are reduced **across the region**, the sites below are the plants most significantly impacted from gas costs or low demand levels. Capacities impacted in '000 tonnes/year put next to product in red, plants colour coded by country, updated on 18 January 2024



SOURCE: ICIS, Natural Earth

MITIGATION RECOMMENDATIONS

- Move to a more service-based approach focused on providing solutions rather than products
- Move away from global supply chains to a more defensible 'local for local' approach
- Build 'moats' versus competition by adopting a demand-led business model instead of being supply-driven

2. CHINA

China's economy remains a major risk for the global economy.

The OECD predicts the country's GDP growth would decline from 5.2% in 2023 to 4.7% in 2024 and possibly slow down further to 4.2% in 2025.

The country faces headwinds in 2024 amid deep-seated structural problems.

First, the real estate crisis could deepen further in China, with negative knock-on effects on the global economy.

China has been trying to expand its role in the world through the $1.5tn Belt & Road Initiative which offered loans to partner countries in exchange for their agreeing to tie the aid to purchases from Beijing. Many of these loans are already at risk, with $78bn underwater and a further $104bn of 'rescue loans' between 2019-21.

Secondly, China is currently expanding its manufacturing capacity at a rapid scale in order to compensate for the jobs being lost due to the implosion underway in the property sector.

Housing

After 20 years of continuous growth, China's $19 trillion economy is now at risk as the housing sector is forced to adjust to oversupply, low demand and high levels of debt held by property developments, local governments and state enterprises.

Its new policy focusing on expanding manufacturing may face significant challenges. Major importers of Chinese goods such as the US and EU are already pushing back, being concerned about preserving local jobs.

A third risk relates to China's move to take greater control of leading technology businesses. Greater state control may intensify against the background of escalating geopolitical tensions.

Regulation
This in turn is already leading to a stricter regulatory environment and the politicisation of the business sector.

Finally, China's key challenge is that it faces an increasing risk of growing old before it grows rich because of its ageing population.

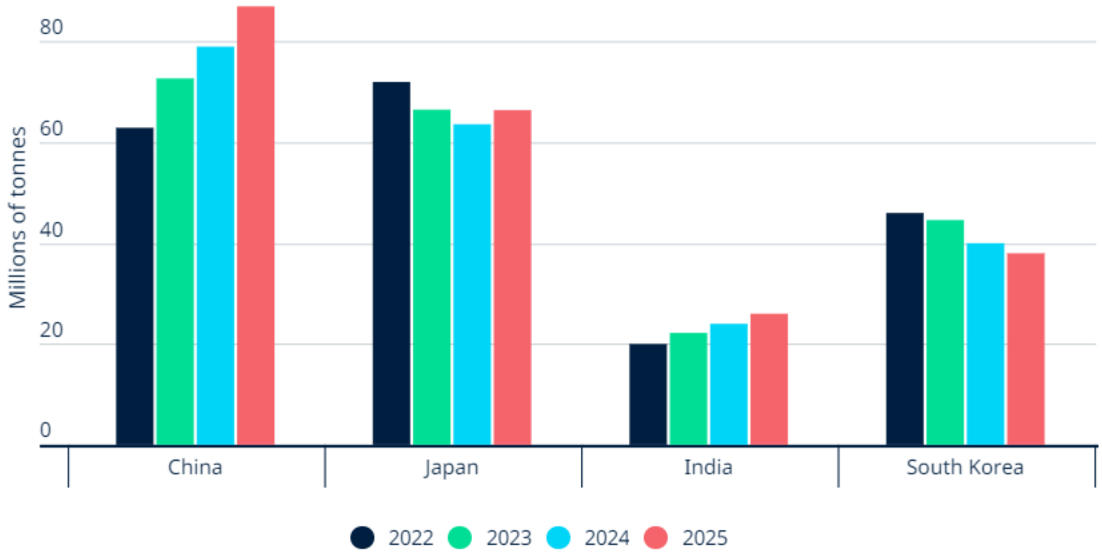
Youth unemployment is also a continuing issue. Data reporting was suspended in June when it reached 21% and subsequently revised. Even under latest reporting system, it still shows it was at 14.9% for December.

<u>IMPACT ON ENERGY</u>
Despite the slugging economic outlook, China regained its position as world's top LNG importer in 2023 after demand fell because of the impact of covid-related restrictions.

ICIS expects China to defend this position in 2024 with LNG imports to be 9% higher year on year as the country will seek to use the fuel to displace highly polluting coal.

However, much of the growth will continue to depend on its economic performance, its ability to scale up greener forms of generation as well as efforts to increase domestic gas production.

LNG demand in Asia

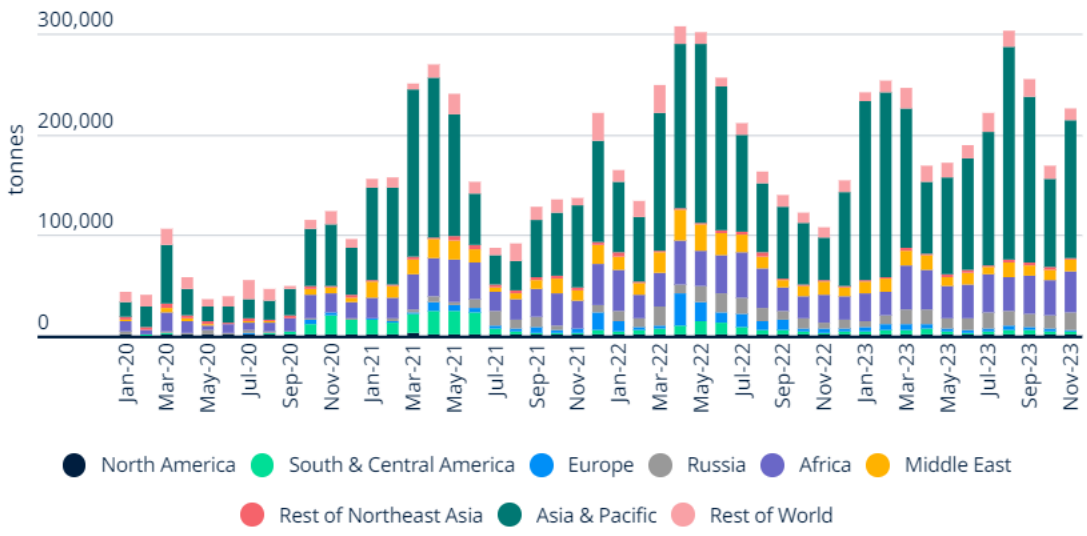


SOURCE: ICIS LNG Edge

IMPACT ON PETCHEMS

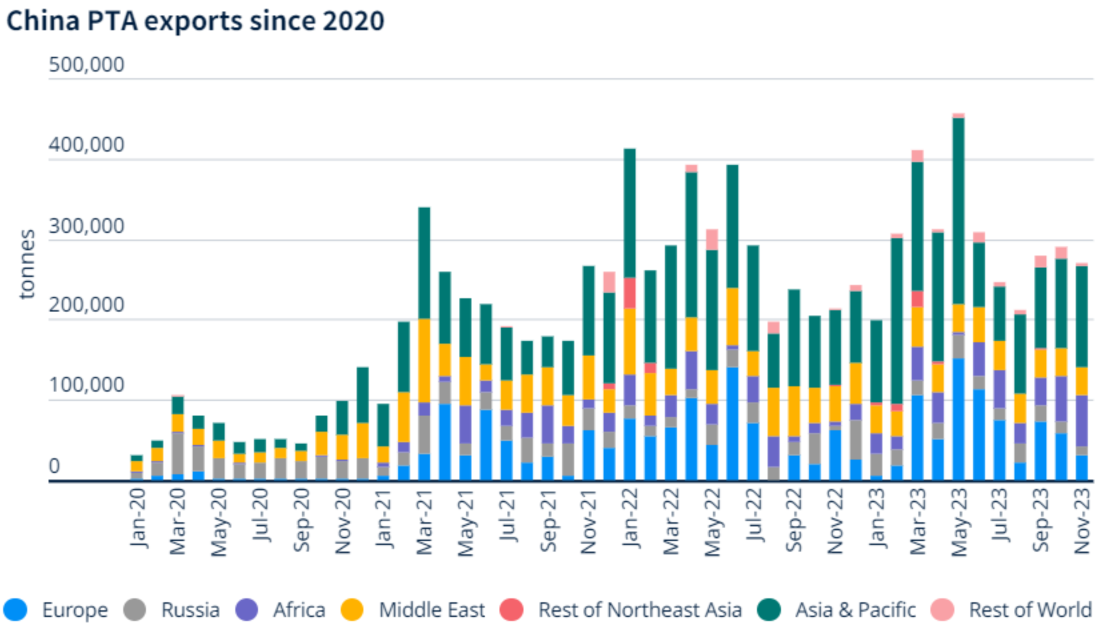
China is now moving rapidly towards self-sufficiency in all the major building-block products. It has already become a leading exporter in areas such as polyvinyl chloride (PVC) and purified terephthalic acid (PTA), which are core products for the construction and polyester industries. It is also no longer importing polypropylene (PP) and polyethylene (PE) which are the core polymers for packaging and other major uses.

China PVC exports since 2020



SOURCE: ICIS Supply & Demand Database (Turkey included in Europe's data)

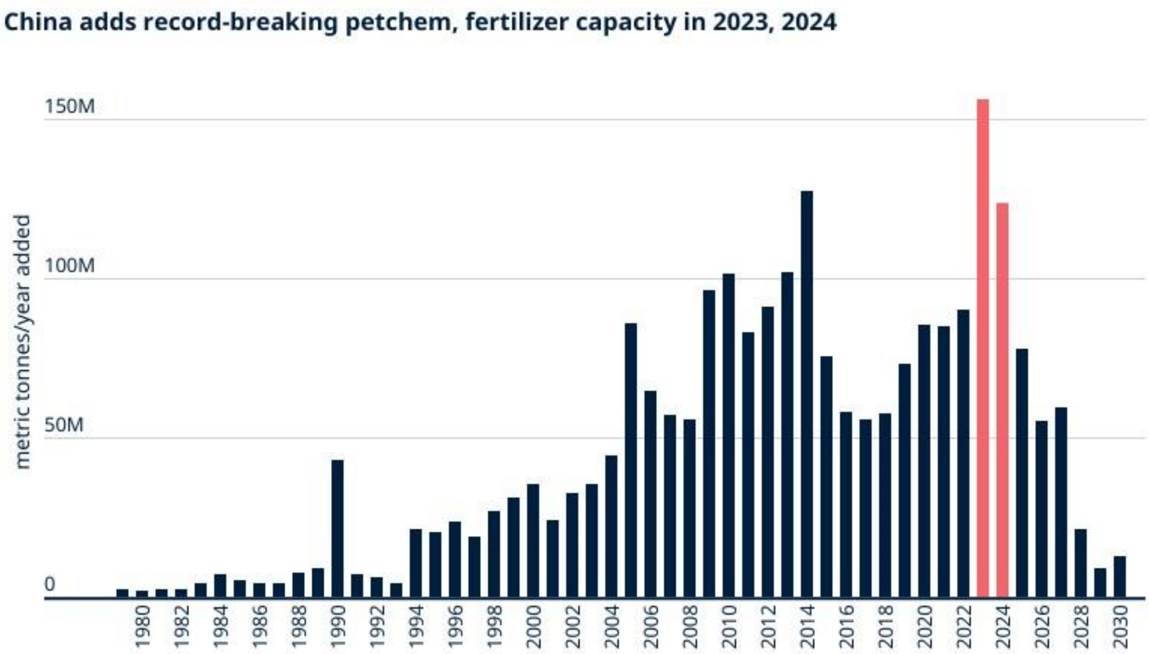
It seems likely that its petrochemical production will increase as the move to electric vehicles gathers pace and refineries need to find an alternative outlet for gasoline streams.



SOURCE: ICIS Supply & Demand Database (Turkey included in Europe's data)

IMPACT ON FERTILIZERS

Fertilizer inventory levels in China are currently almost double the volume they were in December 2022. In December 2022, Chinese port inventory levels averaged at 1.5m tonnes, compared to 2.7m in December 2023 and demand outlook for 2024 remains subdued. This will also have a bearish impact on demand for gas as the fuel is a key ingredient in fertilizer products.



SOURCE: ICIS Supply & Demand Database

MITIGATION RECOMMENDATIONS

- Corporate resilience today means reducing China exposure – both directly and indirectly – to an absolute minimum
- Move into areas where China's focus on exports finds it more difficult to reach – in other words, moving away from selling products, which China can easily replace, and instead sell services based on the value of the solution provided.
- Increase resilience by returning to a local-for-local supply profile and examine the potential to manufacture downstream products

3. GEOPOLITICS

The impact of the 2020 Covid-19 pandemic may have accelerated some of the trends towards deglobalisation and protectionism but the underlying drivers might have already been at play.

These risks may further increase in 2024 as more than 50 countries will hold elections, including eight major economies that represent half of the global GDP. The period before and after elections will see disruption of budgets, war funding and an increase in rhetoric.

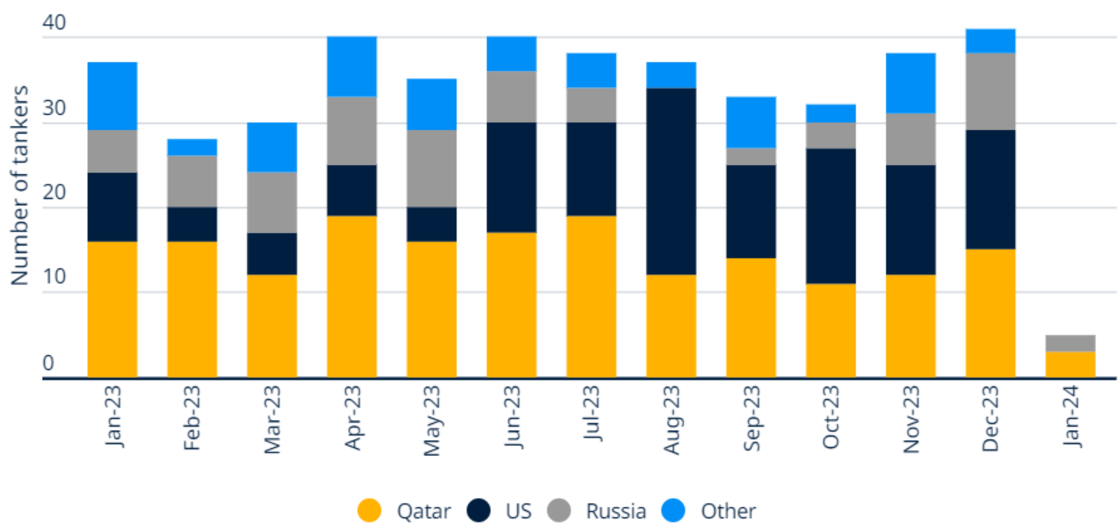
A multipolar world will continue to emerge as countries seek to carve out strategies and alliances to protect their perceived national interest.

So far in the political cycle there is nothing to suggest that this trend will reverse although a glimmer of hope may have emerged from the consensus achieved at COP28 in 2023.

Conflict

The risk of military confrontation continues to grow with the disruption of key shipping choke points and increased deep sea maritime risk causing concern. This will impact maritime freight with particular concern for food and energy supplies.

Laden LNG tankers crossing Suez by origin



SOURCE: ICIS LNG Edge (Figures for Jan 2024 only up to 12th January)
*French, Belgian cargoes added to Russian total as likely ship-to-ship transfers of Russian cargoes

Disruption in the energy transition caused by changing regulatory environment or interference in supply chains of raw materials, key components and finished products will continue.

Low growth, high energy prices and spiralling food costs are a recipe for electoral shocks and a shift to more radical governments, which could lead to more protectionism and unrest.

Climate litigation has become an ongoing reality for many businesses and governments and it may become a significant factor in business strategy and liability risk management.

<u>IMPACT ON ENERGY</u>
Although natural gas prices have fallen from record levels in 2022 after Russia's invasion of Ukraine, geopolitics will remain a major risk factor, as the global gas market remains relatively tightly supplied for now.

Risks will be linked to elections across the world but also to ongoing wars in Ukraine, the Middle East and Africa, which could disrupt supply.

Other risks relate to possible infrastructure attacks or disruptions through major sea routes.

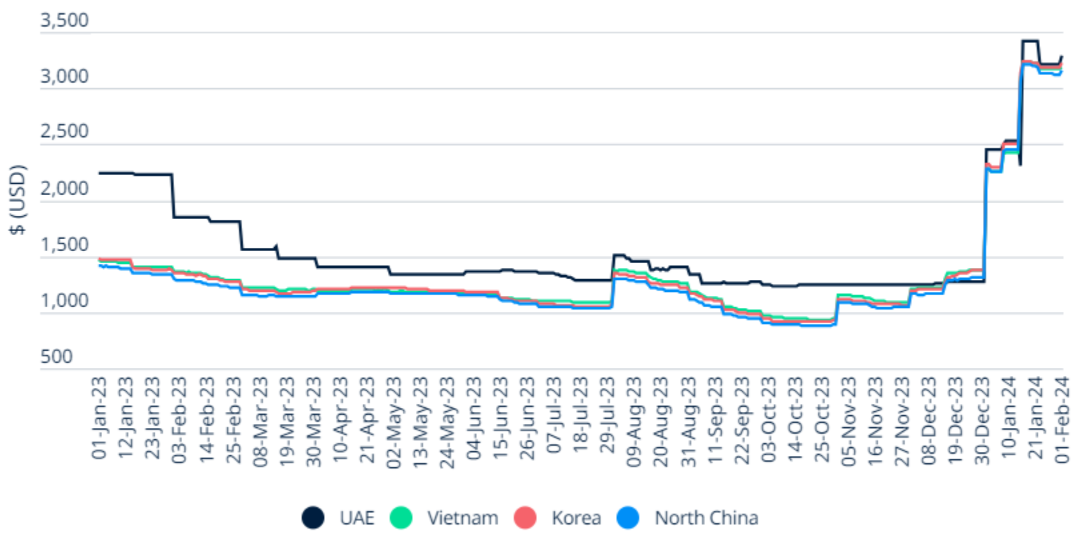
ICIS LNG Edge records show that only five laden LNG tankers crossed the Suez Canal at the Red Sea's northern end in the first half of January 2024 compared with around 40 in December 2023.

<u>IMPACT ON PETCHEMS</u>
Asian suppliers such as Formosa Plastics have issued force majeure notices as they can no longer charter container shipping.

The disruption of the Red Sea route means 90% of normal freight movements by major shippers such as Maersk are instead having to route around Africa via the Cape of Good Hope.

Shipping routes into Europe

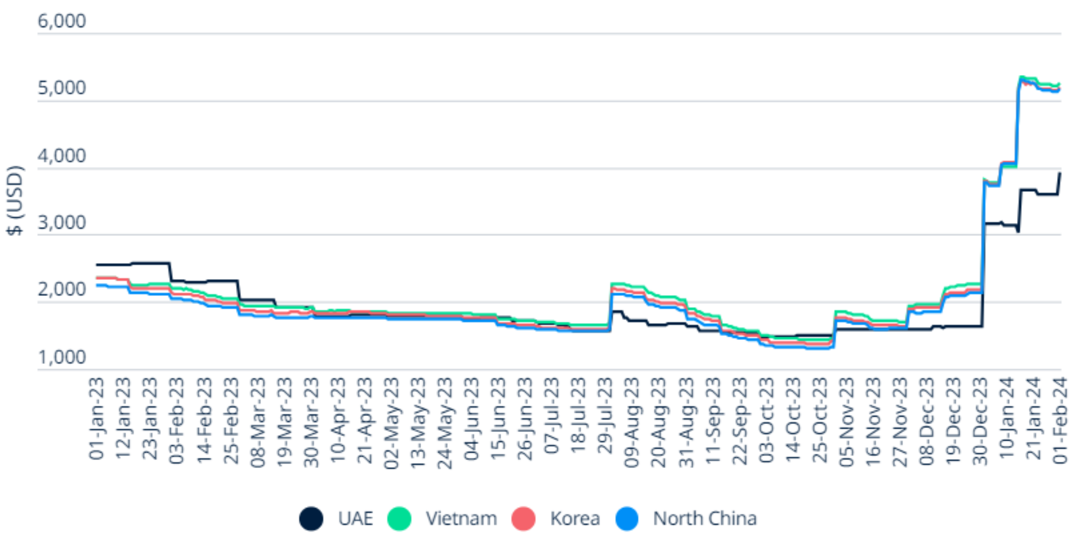
20ft Dry Cargo weekly container freight rates (short contract type, terminal handling charges at both ports)



SOURCE: Xeneta (updated till 01 February 2024, mean values used)

Shipping routes into Europe

40ft Dry Cargo weekly container freight rates (short contract type, terminal handling charges at both ports)



SOURCE: Xeneta (updated till 01 February 2024, mean values used)

Spare shipping capacity doesn’t exist on the scale required, which freight rates are seeing major increases. Rates from Shanghai to Rotterdam more than doubled in just two weeks at the start of 2024 but the generally subdued demand for petrochemical products may cap gains.

IMPACT ON FERTILIZERS

The gas-intensive fertilizer sector suffered major headwinds following the invasion of Ukraine. While gas prices dropped as Europe reduced its dependence on Russia supply, fertilizers may still witness volatility as global gas supplies remain tight.

Global tensions such as the Israel-Hamas conflict could lead to supply disruptions of raw materials for fertilizer production.

MITIGATION RECOMMENDATIONS

- Appoint a single point of accountability and create a rapid reaction troubleshooting process and team
- Test government, regulatory and public affairs capabilities
- Analyse procurement and supply chains for choke points and key infrastructure vulnerabilities and develop backup plans
- Increase training and awareness of risk identification and mitigation plans
- Cooperate with stakeholders and third parties to think outside of the box
- Add or update geopolitical risk assessments and develop an active risk register and management plan
- Review financial exposures across operating and sales footprint

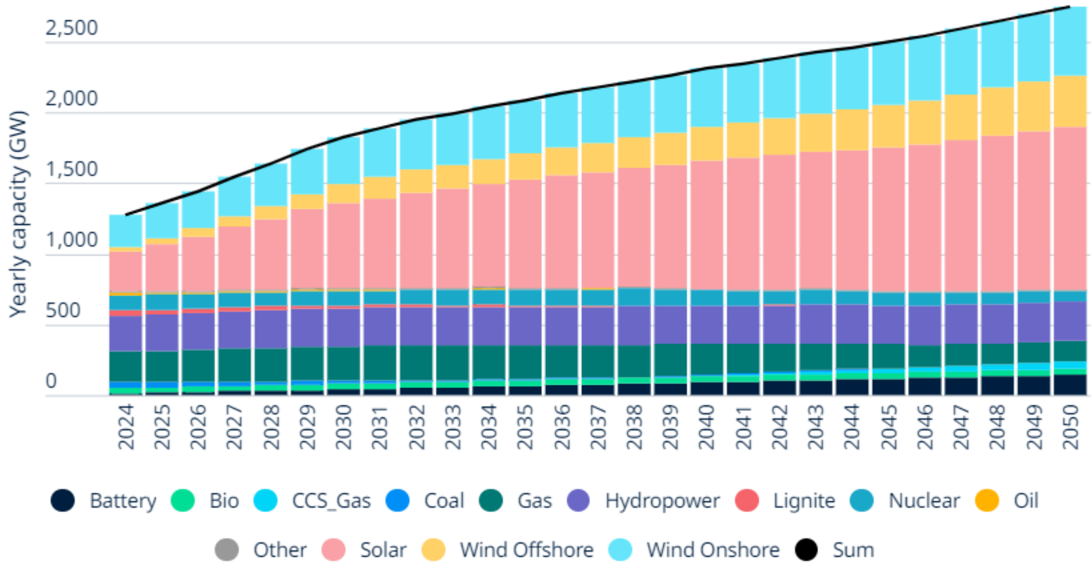
4. ENERGY TRANSITION

The global transition towards renewable energy will continue to accelerate in 2024, driven by international commitments to cut fossil-fuel emissions, falling technology costs and relatively high fossil fuel prices.

While the energy transition may pose some risks to the stability of global energy supplies given the variability of renewable resources, the progress of the transition itself also faces risks related to supply chains, regulatory unpredictability, geopolitics and technological shifts.

The deployment of renewable technology has expanded in recent years and is set for further growth. The IEA predicts that under existing policies and market conditions global renewable capacity could grow to 7,300GW over the period 2023-28, with solar and wind power accounting for 95% of the expansion.

EU power capacity till 2050



SOURCE: ICIS

Supply chains
Such growth requires resilient supply chains but these have been under strain from fluctuations in the delivery and prices of raw materials as well regulatory changes.

As geopolitical tensions escalate, many countries are looking inward, seeking to develop domestically the necessary equipment to scale up renewable capacity deployment.

The trend is likely to accelerate this year, particularly following the implementation of both the Inflation Reduction Act (IRA) in the US and the EU's Green Deal Industrial Plan.

The success of the energy transition will also depend on the swift deployment of innovative technology such as electric vehicles, battery storage and the production of green gases such as hydrogen.

Standardisation
Yet industry leaders complain that the uptake is slowed by an absence of technological standardisation. And while efforts are being made to address this, those are themselves causing issues.

For example, the wind sector is struggling on both sides of the Atlantic not only because of supply chain problems but also because there had been an excess of customisation of equipment, which pushed up costs and hit profitability.

The looming implementation of the EU's carbon border adjustment mechanism (CBAM), which will mandate the introduction of a tariff on carbon-intensive products imported from outside the bloc is expected to incentivise countries to speed up their energy transition.

The transition itself will likely continue to pose risks to the wider global energy supply in 2024.

IMPACT ON ENERGY

Possibly the biggest risk to the energy transition itself comes from the additional infrastructure required to connect distributed renewables to an increasingly electrified set of energy demands.

In most countries, electricity grid infrastructure is struggling to cope with demand, and the upfront investment to fix this is huge, making investment decisions very sensitive to high interest rates.

IMPACT ON PETROCHEMICALS

For chemical companies the biggest risks come from two main areas: shifting customer demand as customers prefer greener products, and from the shifting feedstock environment. As refineries close, feedstock availabilities will change. Often these effects will be very local in nature and companies need to take a granular approach to addressing them.

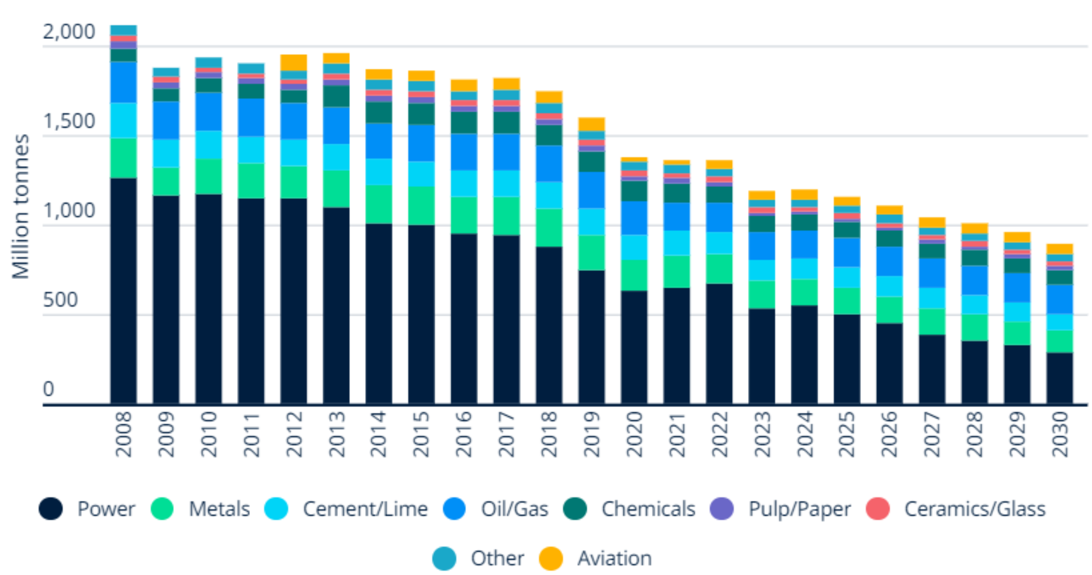
Some Middle Eastern participants in particular are attempting to protect themselves from declining oil and gas demand by pushing fossil feedstocks into petrochemicals, for example by pushing crude oil to chemicals plants.

IMPACT ON FERTILIZERS

The ammonia sector, which is the highest contributor of greenhouse gas emissions in the fertilizer sector, will continue to face the greater technological challenges in adjusting as it will seek to switch to climate-friendly production processes.

The nitrogen sector, which also has a high carbon footprint will also have to switch to more friendly production processes. As a result, the fertilizer production mix may switch to include less nitrogen and more potash.

EU emissions per sector



SOURCE: ICIS

MITIGATION RECOMMENDATIONS

- Develop a clear understanding of the feedstock position of your business, understanding that refineries and gas processing plants will continue to close as fossil fuel demand declines
- Plan for adding further new feedstock sources – from bio-based, waste and other renewable sources
- Develop new business models for the smaller and more local production that will result from moving towards renewable feedstock sources
- Plan for the fact that increasing amounts of wind and solar power will result in increasing periods when there is excess electricity production. Develop technologies and business models that can exploit this "predictably unpredictable" free energy.

5. CYBER THREATS

The average number of cyberattacks against energy utilities each week more than doubled between 2020-22 according to an International Energy Agency (IEA) report, with hackers on occasion remotely disabling transmission systems or power plants.

Last year alone, weekly attacks averaged more than 1,100 across the globe, the IEA said, and that number is likely to grow in 2024 amid greater geopolitical risks.

There are numerous instances showing the gravity of the problem.

In January 2021, rogue actors targeted oil loading facilities in the Amsterdam-Rotterdam-Antwerp refining hub, Oiltanking in Germany, SEA-Invest in Belgium, and Evos in the Netherlands. The cyberattack impacted the regional flow of oil products, such as heating oil, diesel, jet fuel, gasoline and fuel oil.

Five months later, Colonial Pipeline was the victim of a ransomware attack. The pipeline, which begins in Texas and terminates in Linden, New Jersey, is one of the largest and most vital oil pipelines in the US.

Also in 2021, a ransomware attack on Saudi Aramco, the world's largest single exporter of crude oil, resulted in exposed sensitive data.

Digital expansion
Most industries are scaling up use of digital technologies to better manage plants and grids. However, this progress comes with increased exposure to cyber-criminal activity.

International surveys of business leaders show that cyber incidents are the most feared cause of business interruption, surpassing natural disasters or energy concerns.

As the world becomes increasingly unstable at geopolitical level, cyberattacks could become a favoured tool in hybrid wars, potentially leading to major disruption in production and supply chains.

This risk is likely to be exacerbated in 2024 as more than 50 countries will hold elections and rogue state or private actors may seek to influence the outcome of polls.

Skilled workforce

Cyberattacks are on the increase in the energy sector but utilities and infrastructure operators face serious difficulties in finding and retaining skilled professionals needed to defend assets.

The energy transition depends heavily on the deployment of cyber technology as all segments of the required infrastructure are digitally operated.

Yet critical infrastructure including oil and gas pipelines as well as water and power utilities are becoming favoured targets. To counter attacks, operators need to constantly raise their IT budgets, often at the cost of sacrificing investment in other areas.

Worldwide cybercrime costs are estimated to hit $10.5 trillion annually by 2025 according to cyber economy researcher Cybersecurity Ventures, emphasising the need for enhanced cybersecurity measures.

IMPACT ON ENERGY

As the global economy undergoes a pivotal shift primarily as a result of the energy transition, the security of electricity infrastructure needs to be a priority, but evidence shows utilities are not sufficiently equipped to handle cyber risks.

Although Europe's natural gas sector has suffered mainly physical attacks on its pipeline infrastructure since the start of Russia's invasion of Ukraine, cyberattacks also pose a threat because the entire value chain from production to retail operations relies on complex, digitally operated technology.

IMPACT ON PETROCHEMICALS

Like the energy sector, petrochemicals are vulnerable to cyberattacks perpetrated by rogue states or private actors.

The industries are also vulnerable to company insiders who pose a threat to energy and chemical sector organisations because they have knowledge of and access to proprietary systems that allow attackers to bypass security measures through legitimate means, according to the US Department of Homeland Security. Insiders may sabotage facility processes or conduct cyberattacks within the organisation's IT systems and networks.

IMPACT ON FERTILIZERS

Agribusiness is increasingly relying on digital and data-driven technology, which also makes it vulnerable to cyberattacks. For example, in 2021 US-based Crystal Valley Cooperative was targeted in a ransomware attack and was forced to take systems offline because of the incident. The attack left it unable to mix fertilizers. Similar incidents may not be isolated and are likely to continue posing a threat to the sector.

MITIGATION RECOMMENDATIONS

- Tighten up end-to-end encryption of systems and implement strict authentication and authorisation procedures
- Carry out appropriate checks of critical updates and deploy them as soon as they are tested
- Ensure facilities deploy proper network segmentation

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ICIS teamed up with Swiss-based strategy consultancy New Normal who provided insights and recommendations made in this report.

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