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One Year On: Energy Amid The Russia – Ukraine Conflict

Energy Research Paper

The Al-Attiyah Foundation

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The Russian invasion of Ukraine in February 2022 has created shockwaves in global energy markets, with fossil fuel supply shortages, changing energy trade flows, and economic uncertainty. After an initial global energy crisis, much adjustment has happened, but serious risks remain. Both sides have further energy weapons they could deploy, from sabotage to sanctions.

What is the impact on Russian oil exports and the European natural gas markets a year into the conflict? Has the conflict driven or damaged the ongoing energy transition? And who are the winners and losers in the energy sector?

ENERGY RESEARCH PAPER

This research paper is part of a 12-month series published by the Al-Attiyah Foundation every year. Each in-depth research paper focuses on a current energy topic that is of interest to the Foundation's members and partners. The 12 technical papers are distributed to members, partners, and universities, as well as made available on the Foundation's website.

Introduction:

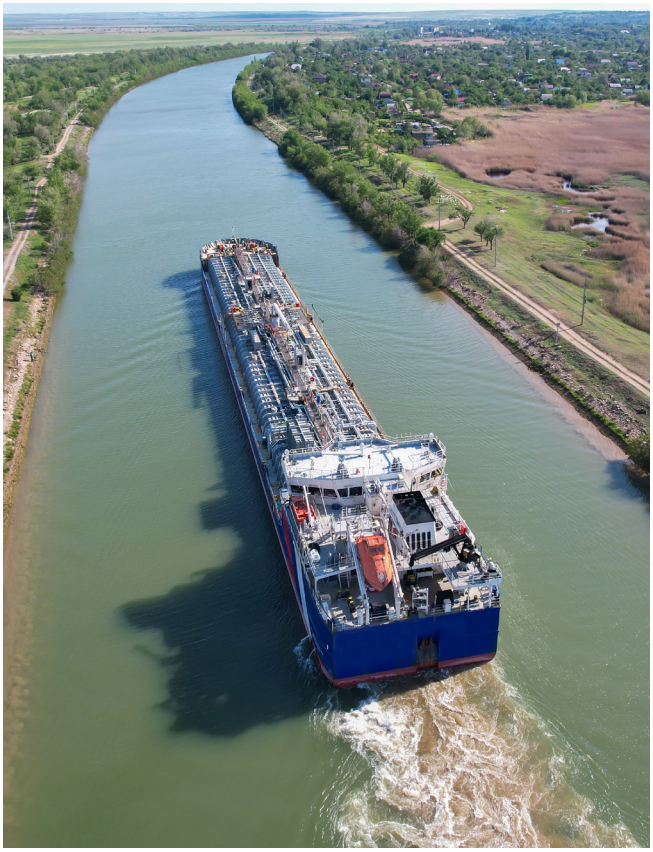
- The ongoing energy crisis began in the aftermath of the COVID-19 pandemic in 2021, with much of the world facing fossil fuel supply shortages, which led to rising prices and volatility across oil, natural gas, and electricity markets. At the time, the energy crisis was caused by a blend of economic factors, including the rapid post-pandemic economic rebound that outpaced energy supply growth. This ultimately escalated into a global energy crisis after the Russian invasion of Ukraine in February 2022.

What is the impact on Russian oil exports and the European natural gas markets a year into the conflict?

- Despite the ever-tightening sanctions on Russia, its oil continues to flow to Asian markets. The appetite for Russian oil and petroleum product has allowed it to deliver 10% of the global liquids supply and maintain its production levels close to pre-war levels.
- The European natural gas market has proved to be resilient in late 2022, as countries were able to fill their storage levels close to ~95% capacity by ramping up non-Russian supplies and rapidly reducing consumption. Consequently, Russia's share of European natural gas demand has declined from 23% in February 2022 to less than 10% in January 2023.

What is the impact of the conflict on the ongoing energy transition?

- Fossil fuel supply disruptions resulting from the Russia – Ukraine conflict have underscored the energy security benefits of harvesting domestic renewable resources (through domestically owned technologies connected to local supply chains), leading many countries to strengthen their renewables and low-carbon policies.
- The limited supply of natural gas has emphasised its importance in home heating and industry, and the difficulty or near-impossibility of replacing it with renewable-based energy in the short to medium-term. This has also been exacerbated by weather-related power shortages, including low hydropower and nuclear generation in Europe and China in the summer of 2022 because of drought.



- As renewable generation increases, investments in low-carbon fuels and technologies such as advanced grid-scale batteries, hydrogen, and nuclear are expected to follow suit in the short-to-medium term. Hydrogen in particular has received major impetus because of its ability to store energy seasonally and to replace natural gas in heavy industry.
- After an initial switch to coal in the European power sector, lower natural gas prices and higher carbon prices in late 2022 to 2023 have led a turn back to natural gas generation. However, in the near-term, high LNG prices (comparted to historical averages) will continue to reinforce coal-to-natural gas fuel-switching in the European and South Asian power sectors, which combined with an easing in COVID-19 related restrictions in China and a positive economic growth projection in India, will prop up demand for coal.

Implications: Who are the winners and losers in the energy sector?

- Large importers of Russian oil, such as India and China, that are accessing Russian oil and petroleum products at discounted prices, and refiners in the United States wh0 see higher refining margins and demand for their products in Europe, have fared well from the ongoing energy crisis.
- Middle East oil exporters have on the whole benefited[i] from higher prices. But discounted Russian crude has replaced some of their core growth markets in China and especially India, and they have partly re-oriented to Europe, now a non-core market. Saudi Arabia, mostly, and Iraq have contributed the largest part of the adjustment.
- Natural gas exporters such as Qatar, Australia, and the United States will continue to benefit from increased global demand for LNG cargoes across Europe and Asia.
- However, the ultimate loser from this crisis is Russia. It has lost 130 BCM / year of natural gas exports to Europe (worth ~US$ 30 billion / year) and is unlikely to find a more reliable and profitable alternative than Europe.

The ongoing energy crisis began in the aftermath of the COVID-19 pandemic in 2021, with much of the world facing fossil fuel supply shortages, which led to sharply rising and volatile oil, natural gas, and electricity prices. At the time, the energy crisis was caused by a blend of economic factors, including the rapid post-pandemic economic rebound that outpaced energy supply growth, coming after a lengthy period of low investments, weather-related problems in Europe and South America, as well as reductions in Russian natural gas supplies to Europe from October 2021 which had knock-on impacts elsewhere. This quickly escalated into a global energy crisis after the Russian invasion of Ukraine in February 2022.

A year into the Russia – Ukraine conflict, Russia has drastically cut its natural gas exports to the European Union, causing a rapid shift in energy trade flows and a surge in global fossil fuel prices. The conflict has exposed Europe's dependence on Russian natural gas supplies, which accounted for 41% of the overall natural gas imports (at pre-war levels)[ii]. In 2022, the European Union and UK sought natural gas supplies from alternative sources such as Algeria, Norway, Qatar, and the United States to meet demand in the winter-heating months and improve short-term energy security.

Since the onset of the conflict, high fossil fuel prices have also affected other regions around the world, particularly African and Asian developing and energy-importing countries that are still recovering from the effects of the COVID-19 pandemic. It is estimated that 70 million people across the developing world who recently gained access to electricity can no longer afford it, and 100 million people may have to revert to using solid biomass for cooking instead of cleaner, low-carbon fuels[iii].

Surging fossil fuel prices have also hampered global economic recovery, growth prospects and increased the risk of social instability. Rising costs have led to cost-push inflation, which has reduced household incomes and increased inequality, especially for low-income groups across developing countries, in addition to negatively impacting the competitiveness and profitability of energy businesses, especially those with business models vulnerable to energy price shocks.

Surging costs have also put pressure on fiscal budgets, as governments have to spend more on energy imports, subsidies, social protection, and emergency measures to support their population and economies. This has limited their fiscal space and ability to invest in long-term sustainable and clean energy projects, which in turn has destabilised their decarbonisation plans, as they resort to increasing coal generation in the short-term to meet their energy needs, and / or invest in domestic fossil fuels projects to ensure energy security in the face of ongoing geopolitical risks.

The energy crisis has not only reshaped the global energy sector in ways that are complex and uncertain. It has also created severe challenges for Russian oil & gas exports, but opportunities in the ongoing energy transition, and for various stakeholders across the global energy value chain.

The conflict has also shown that energy security is not the same as energy independence or self-sufficiency. Europe has concluded that a renewables-led transformation of the energy system is the only desirable option to enhance energy security in the long-term and the only viable pathway to materialising its net-zero goals and emission reduction targets. Japan and South Korea have been encouraged to boost the role of nuclear power, while South and South-east Asian countries have accelerated plans for renewables while also limiting natural gas imports in favour of coal.

07 WHAT IS THE IMPACT ON RUSSIAN OIL EXPORTS AND THE EUROPEAN NATURAL GAS MARKETS A YEAR INTO THE CONFLICT?

Despite the ever-tightening sanctions on Russia, its oil continues to flow to Asian markets. The appetite for Russian oil and refined products has allowed it to deliver 10% of the global liquids supply and maintain its production levels close to pre-war levels[iv].

Sanctions on Russia include:

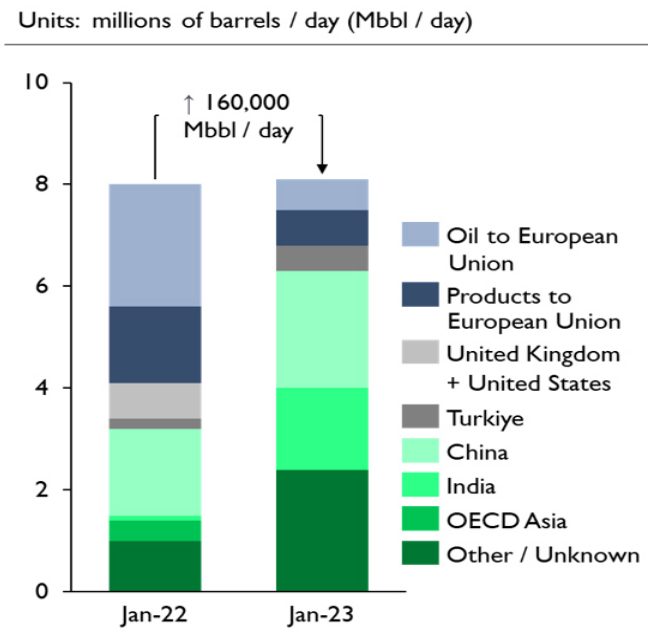
- a ban on nearly all oil and petroleum products imports by Australia, Canada, the European Union, the United Kingdom, and the United States,
- a price cap of US$ 60 / bbl on Russian seaborne crude exports imposed by the G7 countries from December 2022, if using G7 or EU shipping, brokerage, or insurance services
- and from February 2023 caps of $100 per barrel on high-value refined products and $45 per barrel on low-value refined products, again if using G7 or EU services[v].

The price cap thus bans any G7 company from providing transportation, insurance, and financing services for Russian oil exports if it is sold at a price above the cap[vi]. These measures have made it harder for Russia to finance its budget. It has raised taxes and price benchmarks on its domestic companies, but this will affect their ability to invest in new energy projects and maintain oil production levels in the long-term. Access to upstream technology has already been severely restricted.

However, Russia has avoided some of the effects of these sanctions by expanding its oil imports to existing markets such as China, India, and Turkey, whilst finding new markets in countries such as Pakistan and Sri Lanka[vii].

In 2022, China, India, and Turkey increased their purchases of Russian oil, collectively accounting for ~70% of the total Russian seaborne oil exports[viii]. Some Russian oil is still finding its way to Europe via the southern Druzhba pipeline, which is exempted under the European Union ban[ix]. The Druzhba pipeline connects Russian oilfields with refineries in Germany, Poland, the Czech Republic, Slovakia, and Hungary[x], and the last three named countries continue to use it, while Bulgaria has an exemption to receive some seaborne imports.

Figure 1: Russian Oil Exports in January 2022 and 2023



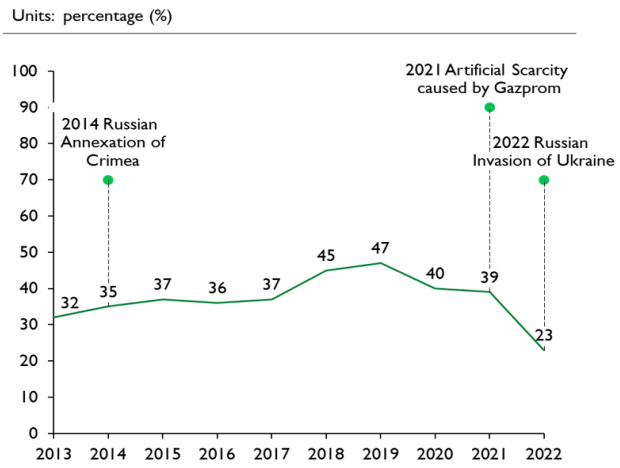
In January 2023, Russia's oil production was only marginally up by 160,000 bbl / day from pre-war levels, with 8.2 Mbbl / day shipped to various global markets[xi]. This decline in production combined with the oil price cap has resulted in Russian monthly oil export revenues declining by 36% y-o-y to US$ 13 billion and its overall fiscal revenues from oil operations declining by 48% y-o-y to US$ 4.2 billion in January 2023[xii].

Hence, the oil and petroleum products ban, along with the price cap, is not only having the intended effect of hurting the Russian economy but also allows Russia to continue to supply oil and petroleum products to global markets, so avoiding a damaging price spike. Brent crude prices reached $123 per barrel in June 2022 but then fell back sharply as disruptions were avoided. They hovered around $85 per barrel from December 2022-February 2023, then dropped steeply again to around $75 per barrel in March 2023 because of worries about the global banking system. Generalised economic fears have thus constrained prices and so cut Russian revenues further. Reported prices for exports of Urals crude, Russia's main grade, from its western ports are below the $60 per barrel cap. This partly reflects the high shipping, insurance, and traders' costs in moving Urals to India or China rather than its historic much shorter route to Europe.

The European natural gas market proved to be resilient in late 2022, as countries were able to fill their storage levels close to ~95% capacity by ramping up non-Russian supplies, boosting non-gas output (such as renewables and coal) and rapidly reducing consumption. Consequently, Russia's share of European natural gas demand has declined from 23% in February 2022 to less than 10% in January 2023[xiii].

The European natural gas markets' resilience is attributed to three factors. Firstly, the European Union diversified its Russian pipeline supplies by increasing imports of LNG, particularly from the United States and Qatar. LNG flows to the United Kingdom and the European Union reached an all-time high of 13 BCM / month in January 2023, which is three times higher than January 2022 (or ~70% higher than Russian pipeline supplies in that month)[xiv xv].

Figure 2: Russian Share of European Union Natural Gas Demand



Secondly, the European Commission's implementation of short and medium-term measures under the REPowerEU plan, which included efforts to improve energy efficiency, encourage fuel-switching, and expand the deployment of renewables and heat pumps, aided in curtailing natural gas demand by 10% (or 50 BCM / year) in 2022 compared to pre-crisis levels[xvi].

In 2023, it is estimated that a 57 BCM / year of supply – demand gap could arise. However, if Europe continues to build on the measures under the REPowerEU plan, it could save another 30 BCM / year of natural gas demand in 2023[xviii]. A recovery in nuclear and hydropower output from the current decade-low levels could also help narrow the supply – demand gap. This depends on weather conditions – the 2022/3 winter was unusually warm but also dry in mainland Europe, potentially creating problems for later in the year, although Norway saw good snowfall.

Figure 3: Short and Medium-Term Measures Implemented under the REPowerEU Plan

Selected Short-term Measures
▪ Common purchases of natural gas, LNG and hydrogen via the EU Energy Platform for all Member States who want to participate as well as Ukraine, Moldova, Georgia and the Western Balkans
▪ New energy partnerships with reliable suppliers, including future cooperation on renewables and low carbon gases
▪ Rapid roll out of solar and wind energy projects combined with renewable hydrogen deployment to save around 50 BCM of naturl gas imports
▪ Increase the production of biomethane to save 17 BCM of natural gas imports
▪ Approval of first EU-wide hydrogen projects by the summer
▪ An EU Save Energy Communication with recommendations for how citizens and businesses can save around 13 BCM of natural gas imports
▪ Fill gas storage to 80% of capacity by 1 November 2022
▪ EU-coordination demand reduction plans in case of natural gas supply disruption

And thirdly, mild weather conditions through most of the European winter helped limit demand for heating and reduced drawdown of stored natural gas.

It is expected that the European Union will not be complacent in preparing for the next winter season, as the risk of natural gas shortages and price spikes continues to remain high. LNG supplies to Europe could also decline due to a tight global market and / or recovery in Asian demand.

Therefore, it is expected that Europe will expand its efforts to achieve energy efficiency gains, increase renewables and heat pump deployment, and achieve energy savings, along with an expansion of natural gas supplies from non-Russian sources.

LNG import capacity has been substantially increased, mostly through new terminals in Germany which did not have any import capability pre-war. Finland, previously entirely reliant on Russia natural gas, also opened an LNG terminal. But there is very little new LNG supply on the global market, and much more will not arrive until 2025 (from the United States) and 2026 - 2027 (from the United States, Qatar, UAE, and Mozambique), so competition for volumes will continue to be fierce.

Apart from Norway, which will maintain current export levels for several years, and possibly some increase from Algeria, the prospect for new pipeline exports to Europe are limited. The East Mediterranean[xix] and the Kurdistan Region of Iraq[xx] have the proximity and resource base to contribute, but politics and investment conditions will likely mean they arrive after 2027, if at all.

Fossil fuel supply disruptions resulting from the Russia – Ukraine conflict have underscored the energy security benefits of harvesting domestic renewable resources (through domestically owned technologies connected to local supply chains), leading many countries to strengthen their renewables and low-carbon policies.

The high prices and change in traditional energy trade routes have forced energy importing countries to prioritise long-term self-sufficiency and energy security through domestic renewables (and sometimes nuclear and coal) generation and ensure that existing energy demand is met in the short-term.

The Inflation Reduction Act (IRA) in the United States, the REPowerEU plan in Europe, and the GX Green Transformation programme in Japan are just a few examples of how policymakers have taken bold action. These are not entirely in response to the war – the IRA in particular is driven by domestic political and environmental considerations and the perceived need to compete with China – but insecure, volatile and expensive conventional energy is a strongly supportive backdrop.

Prior to the conflict, affordability and reliability restricted the uptake of renewables. High fossil fuel prices have improved the long-term cost-competitiveness of renewables.

In 2022, 109 GW of renewable capacity across non-OECD produced savings of US$ 6 billion / year, with 50% of the savings coming from onshore wind[xxi]. Utility-scale solar PV and hydropower resulted in US$ 1 billion / year of savings each[xxii]. In the same year, 83% of the new electricity generation capacity came from renewable sources, with renewable capacities increasing by 10% y-o-y[xxiii].

Figure 4: Electricity and Renewables Policy Changes and Announcements

Country	Policy Changes	Authority
European Union	Phase-out coal power plant in Czech Republic, Slovenia, and Romania.	Various governments (January and June 2022)
United States	Inflation Reduction Act provides funding for energy and climate programmes, including expanding and extending tax credits and incentives to promote clean energy technologies.	Federal government (in law August 2022)
China	New plan for Renewable Energy Development: higher target for renewables.	National Development and Reform Commission (June 2022)
South Korea	Increase renewables in electricity generation to over 20% and nuclear power to over 30%, and decrease coal generation by 2030 under the New Energy Policy Direction.	Federal Government (in law July 2022)
Japan	Restart nuclear power projects aligned with the 6th Strategic Energy Plan and the Green Transformation (GX) policy imitative.	Ministry of Economy, Trade, and Industry (August 2022)

Country	Announced Policies	Authority
G7 Member States	Achieve pre-dominantly decarbonised electricity sectors by 2035.	G7 Ministers of Climate, Energy, and the Environment (May 2022)
European Union	Fit for 55: Council agrees on binding 40% EU-level target for renewables in overall energy mix.	Council of the European Union (June 2022)
Germany	Green energy law reforms sets higher targets for wind and solar generation.	Government (July 2022)
Bahrain, Indonesia, Nigeria, and Saudi Arabia	Net Zero Emissions target by 2060	Various governments
United Kingdom	Energy Security Strategy sets new ambitions for offshore wind, nuclear, and hydrogen.	Prime Minister (April 2022)
Japan	Accelerate nuclear expansion, including SMRs envisioned in the GX initiative.	June 2022

The limited supply of natural gas has emphasised its importance in home heating and industry, and the difficulty or near-impossibility of replacing it with renewable-based energy in the short to medium term. This has also been exacerbated by weather-related power shortages, including low hydropower and nuclear generation in Europe and China in the summer of 2022 because of drought.

Phasing-out natural gas from the European power sector is a challenge, since turbines can respond quickly to demand peaks, including those related to winter heating and to fluctuations in wind and solar output.

The evening demand peak in winter heating is impossible to meet with solar since sunshine is low even during the short winter days, and batteries would quickly be drained.

Wind turbines can help meet this demand, but only if conditions are favourable. Coal and nuclear power can provide a stable output, but they cannot ramp-up their production easily in response to this peak in demand. The UK did keep some coal plants on standby in the 2022-23 winter, but this is not a long-term sustainable solution.

Large-scale batteries are limited due to their cost feasibility and hydropower is also limited by location and weather. For example, last summer, Europe experienced one of the worst droughts in 500 years, which adversely affected hydropower generation and cooling systems of nuclear power plants[xxiv]. Similarly, a severe drought and sweltering heat led to a drop in hydropower in China, causing electricity shortages and forcing the government to ration electricity across some provinces. The resulting power crunch threatened supplies of metals such as aluminium, automotive parts, as well as food commodities[xxv].

Hence, in the medium term, natural gas will continue to be the main option for meeting European winter heating, summer cooling, and specifically industrial demand. The fuel source also has the advantage of being delivered as a utility-service through domestic pipelines. Other fuels like heating oil and propane are usually more expensive than gas, and must be delivered by road, which can be disrupted easily from harsh weather conditions and / or supply chain issues.

However, renewables are poised to overtake coal as the largest source of electricity generation by 2025[xxvi]. Their share in the global electricity mix is projected to reach 38% in 2027, with solar PV and wind accounting for 20%[xxvii].

Between 2022 – 2027, renewables are the only electricity generation whose share is expected to grow, with declining shares for coal, natural gas, nuclear, and oil generation.

Figure 5: Renewable Capacity Growth across Selected Countries and Regions

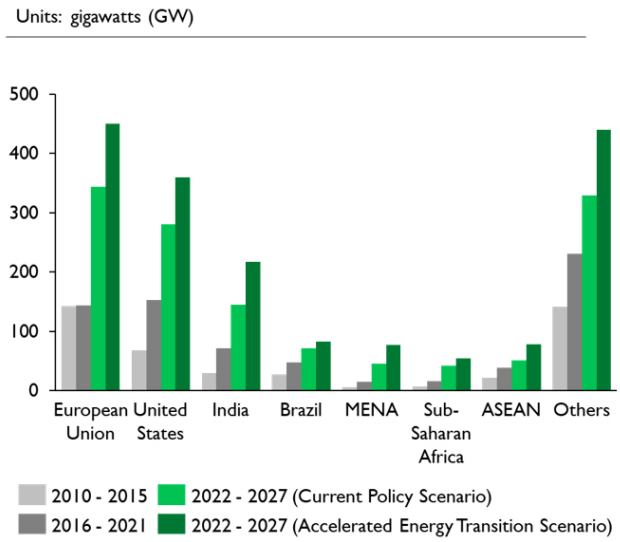
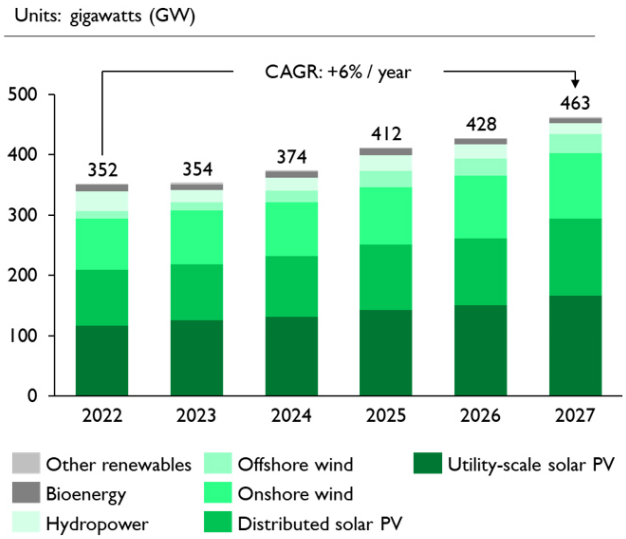


Figure 6: Global Annual Renewable Net Capacity Additions



However, the supply chain disruptions and high inflation, compounded by the ongoing fallout from the COVID-19 pandemic, have highlighted the potentially risky levels of supply chain concentrations of components used to manufacture renewable and low-carbon technologies, and the critical minerals and metals that are used in them.

The United States, China, and Germany collectively account for ~70% of the manufacturing capacity for mass-manufactured technologies such as solar panels, wind turbines, batteries, electrolysers, and heat pumps, t, with China being the dominant provider[xxviii].

Similarly, the geographical distribution of critical mineral and metals extraction and processing is also very concentrated. For example, the Democratic Republic of Congo (DRC) alone produces 70% of the world's cobalt, and just three countries (China, Australia, and Chile) collectively account for 90% of global lithium production[xxix]. Russia mines 42% of the world's palladium and nearly 11% of platinum, used as catalysts in hydrogen electrolysers and fuel cells, and is an important miner of nickel, a constituent of some batteries. China is less dominant in the mining of rare earths (used in powerful magnets for wind turbines and electric car motors) than it used to be, but it retains a near-monopoly on their processing. Chinese companies also have large stakes in minerals elsewhere, such cobalt mining in the DRC.

Thus, European, and North American technology manufacturers are increasingly seeking to limit and diversify their dependency on components and raw materials from China and Russia, through more localised or regional sourcing. And this trend is likely to increase if China decides to increase its support for Russia in the conflict[xxx].

As renewable generation increases, investments in low-carbon fuels and technologies such as advanced grid-scale batteries, hydrogen, and nuclear are expected to follow suit in the short-to-medium term. Hydrogen has received major impetus because of its ability to store energy seasonally and to replace natural gas in heavy industry.

The rapid scale-up of energy storage technologies is critical to meet the flexibility needs of a decarbonised electricity system that will be heavily dependent on renewables. These technologies will be essential in addressing the hour-to-hour variability of solar PV and wind generation, as well as longer seasonal supply-demand mismatches, and will be part of wider grid reinforcement and demand-side response strategies, and the development of the electricity grid of the future.

Pumped-storage hydropower is currently the most widely deployed storage technology, with a total installed capacity of 160 GW, and is mostly found in the United States[xxxi]. However, grid-scale batteries are catching up, with installations increasing by 60% y-o-y to 16 GW in 2021[xxxii]. The grid-scale battery mix continues to be dominated by lithium-ion battery storage, making up the majority of all new capacities installed.

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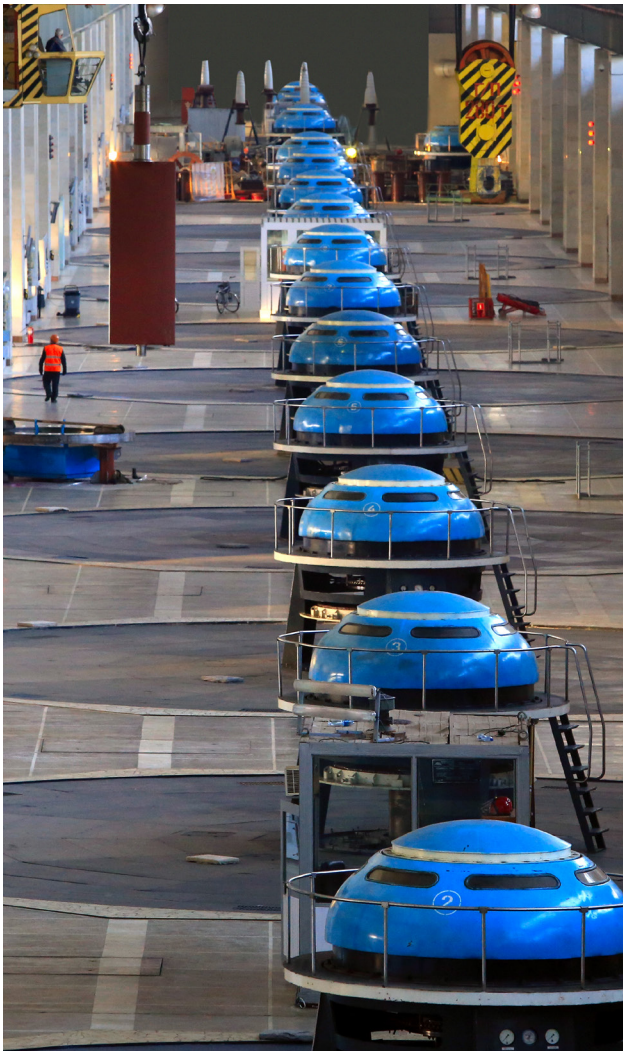

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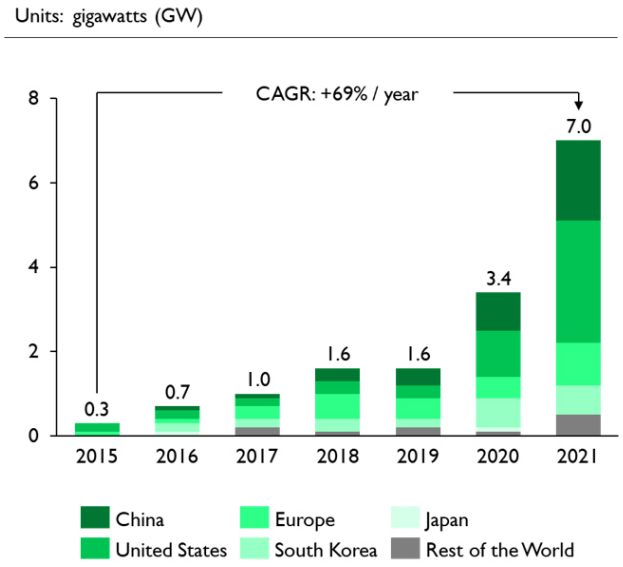
Figure 7: Annual Grid-Scale Battery Storage Additions



The conflict in Ukraine has also turbocharged the green hydrogen industry, as global capacities passed the 1 GW mark at the end of 2022[xxxiii]. The increase in fossil fuel prices has led to average grey hydrogen production costs increasing to US$ 6.71 / kilogram in Europe and the Middle East, and US$ 5.28 / kilogram in China; making it potentially more expensive than green hydrogen, which theoretically ranges between US$ 3.22 / kilogram – US$ 6.68 / kilogram, although there is no large-scale production to date[xxxiv]. Hydrogen is a zero-carbo fuel (at the point of use) which can replace natural gas in heavy industry (steel, ammonia, methanol, petrochemicals, high-temperature heat) and power generation, at least for seasonal balancing.

A decade after the 1973 energy crisis, construction started on 170 GW of nuclear projects, which accounts for 40% of today's total nuclear capacity[xxxv]. With the right policy support, tight cost controls, and the need to expand the share of non-fossil fuels in the energy mix – the current energy crisis could lead to a similar revival for nuclear energy.

China, France, India, Poland and the United Kingdom have recently announced energy strategies that include a substantial role for nuclear in their energy mix. The United States is investing US$ 230 million in advanced nuclear reactor designs[xxxvi]. Belgium and South Korea have scaled back their plans to phase-out existing nuclear capacities. And Japan has expedited safety approvals in order to restart its nuclear capacities, which could free up LNG cargoes that are desperately needed in European and other Asian markets.

Figure 8: Selected Developments in Support of Nuclear Power

Country	Selected Developments in Support of Nuclear Power, 2020 – 2022
United States	▪ As part of the 2022 Civil Nuclear Credit Program, a US$ 6 billion investment to help preserve the existing fleet. ▪ Allocation of US$ 8 billion to demonstrate clean hydrogen hubs, including at least one hub dedicated to the production of hydrogen with nuclear energy. ▪ Following the Advanced Reactor Demonstration Program, a total of US$ 3.2 billion investment over seven years on two nuclear projects
United Kingdom	▪ As part of the 2022 Energy Security Strategy ambitions for eight new large reactors, as well as small modular reactors, to achieve nuclear generation capacity of 24 GW by 2050, or around 25% of the forecast electricity demand. ▪ The Nuclear Energy (Financing) Act, enacted in 2022, made a provision for the implementation of a regulated asset base model. ▪ In 2021 a government commitment of GBP 210 million in funding to develop an SMR, matched by GBP 250 million in private investment.
France	▪ Following the France 2030 investment plan, announcement to extend the lifetime of all nuclear reactors that can be extended while ensuring safety. ▪ Announcement of plans to build six new large reactors starting in 2028 at a cost of around EUR 50 billion, with an option to build eight more by 2050. ▪ A EUR 1 billion investment to develop innovative reactors, including a small modular reactor by 2030.
South Korea	▪ The new government elected in 2022 plans to support lifetime extensions of current facilities, restart construction at two sites, develop and enhance cooperation on SMRs, seek to build ten plants overseas by 2030.
Japan	▪ In 2022, the government announced it would increase energy security with a view to restart existing reactors provided they are safe.
China	▪ Under the 14th Five Year Plan period (2021-2025), maintain a steady pace of construction setting the goal of about 70 GW by 2025, versus 53 GW at the beginning of 2022.

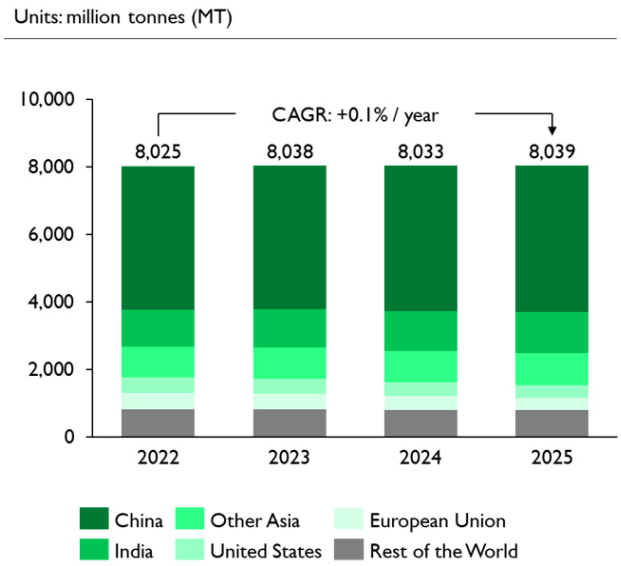
After an initial switch to coal in the European power sector, lower natural gas prices and higher carbon prices in late 2022 to 2023 have led a turn back to natural gas generation. However, in the near-term, high LNG prices (comparted to historical averages) will continue to reinforce coal-to-natural gas fuel-switching in the European and South Asian power sectors, which combined with an easing in COVID-19 related restrictions in China and a positive economic growth projection in India, will prop up demand for coal.

In 2022, global coal demand increased by 1.2% y-o-y (or 8 billion tonnes), which was the highest y-o-y increase since 2013, despite countries agreeing to phase down coal use at the United Nations Climate Conference in Glasgow only a year before[xxxvii]. This increase in coal use was mainly driven by natural gas-to-coal fuel-switching across Europe, China, and India; despite the continued decline in coal consumption in the United States[xxxviii].

In Europe, coal demand increased by 7% y-o-y in 2022, on top of the 14% y-o-y increase in the preceding year. This was mainly driven by the rise in demand from the power sector, where coal was used to replace natural gas, which has been expensive and in short supply[xxxix]. In addition, reduced hydropower and nuclear electricity output due to drought and heatwaves, combined with technical problems at French nuclear power plants, has also put additional strains on the European electricity system.

In China and India, where coal is the backbone of the electricity mix and natural gas accounts for a small fraction of electricity generation, the impact of surging natural gas prices on domestic coal demand has been limited. For example, in China, coal use declined by 3% y-o-y in 1H 2022 as renewed COVID-19 lockdowns across some cities slowed economic growth, but an ease in restrictions in 2H 2022 led to a plateau in annual coal consumption, which was back at the same levels as in 2021[xl]. In India, coal use increased by 7% y-o-y as strong economic growth pushed up electricity demand[xli]. The increase in coal use in these countries has replaced some LNG demand, which was purchased by other countries that also paid a higher premium for it.

Figure 9: Global Coal Demand



The conflict has hindered the energy transition in the short-term, with natural gas supply shortages leading to an increase in coal consumption. However, these high natural gas prices have also improved the long-term cost-competitiveness of renewable generation, which energy-importing countries are increasing to enhance their energy self-sufficiency and security.

Large importers of Russian oil, such as China and India, that are accessing Russian oil and petroleum products at discounted prices, and refiners in the United States wh0 see higher refining margins and demand for their products in Europe, have fared well from the ongoing energy crisis.

Since the start of the conflict, Russia has been offering its oil at a discounted rate to China and India. Both countries have been buying Russia's flagship Ural grade at a discount of US$ 32 – US$ 35 / bbl to Brent[xlii]. The discounted supplies have helped them lower their energy import bills and curtail inflationary pressure, despite the United States along with some European countries criticising their decision.

Other countries in Asia, such as Sri Lanka and Pakistan, are also importing small quantities of Russian Urals grade, as both cash-strapped countries take advantage of price discounts created by Western sanctions and buyer aversion. From May 2022 – October 2022, Sri Lanka imported 2.6 Mbbl from Russia, accounting for 79% of its total oil imports[xliii]. Pakistan will start receiving oil deliveries from Russia in March 2023, which will provide some respite for its limited foreign exchange reserves.

Refiners in the United States have also benefitted from the conflict, as they increased their exports and share of petroleum products supplies to Europe amid high demand and tight supplies. In 2022, average net exports of petroleum products from the United States increased by 7% y-o-y to 5.9 Mbbl / day[xliv].

Commodity traders with advanced trading capabilities, such as Trafigura and Glencore, have also benefitted through their contango trading strategies by exploiting the price differentials and arbitrage created by the disruption of Russian oil supplies[xlv].

Middle East oil exporters have overall benefited from higher oil prices. However, discounted Russian supplies has replaced some of their core growth markets in China and especially India, and they have partly re-oriented to Europe, which is now a non-core market. Saudi Arabia, mostly, and Iraq have contributed the largest part of the adjustment. Meanwhile Iran faces more competition from Russia oil in its only remaining paying market, China, but it has still managed to raise exports after US sanctions enforcement apparently eased off.

The windfall from high oil prices has helped alleviate short-to medium-term budgetary and liquidity problems for Middle Eastern oil exporters and allowed them time to re-think fiscal restructuring. Gulf Cooperation Council (GCC) countries experienced an increase in GDP by 6.1% y-o-y in 2022 on the back of increased oil prices, as well as fiscal surpluses for the first time since 2014[xlvi]. The aggregate GCC fiscal surplus is estimated to have reached US$ 27 billion in 2022[xlvii].

Long-term annual contracts with Asian refiners will initially protect Middle Eastern oil exporters from competing Russian supplies. However, in the long-term, they will have to consider by how they are willing to displace oil exports from their core growth markets in Asia into the shrinking European markets; and in the case of Iran, how it retains its sole remaining customer (China) without further discounting.

In the near-term, as Russian oil supplies are redirected to Asia, Europe will continue to find cover from West African, US and Norwegian supplies. And in a scenario where European oil markets are tight, then OPEC+ (particularly, Saudi Arabia, the UAE, and Iraq) has the upper hand as they can serve as balancers, helping Europe fulfil its import requirements. The likelihood of such a scenario is reasonable, given the vulnerabilities and the risk of unreliable supplies from Libya, Nigeria, and even Iran, where political tensions can limit oil production and sales.

Overall, Middle Eastern oil and petroleum products exporters have gained from the energy crisis, mainly in the form of higher prices. They have also benefited from opportunities to refine, use, store, and redistribute Russian crude and products.

Natural gas exporters such as Qatar, Australia, and the United States will continue to benefit from increased global demand for LNG cargoes across Europe and Asia.

In 2022, Qatar and Australia were the leading exporters of LNG, followed very closely by the United States. Exports from Qatar grew by 3% y-o-y, while deliveries from Australia remained broadly stable at elevated levels, despite some upstream production constraints[xlviii].

LNG exports from the United States increased by 11% y-o-y in 2022, thanks to new liquefaction capacity additions at Calcasieu Pass LNG and the sixth train at Sabine Pass LNG coming online, despite a prolonged outage at the Freeport LNG terminal in Texas following an explosion[xlix].

On the demand side, Europe led the growth in LNG imports in 2022, which increased by 63% y-o-y, making up for a significant fall in piped natural gas deliveries from Russia[l].

In 2023, global LNG trade is expected to grow by 4% y-o-y to 180 BCM / year, mainly driven by a further increase in European imports and a slight rebound in Asia after the region's demand drop in 2022[li].

However, the ultimate loser from this crisis is Russia. It has not only lost 130 BCM / year of natural gas exports to Europe (worth ~US$ 30 billion / year) but is unlikely to find a more reliable and profitable alternative than Europe[lii].

Prior to the conflict, Russia was a relatively reliable supplier of natural gas to Europe. Despite tensions with the Western world during the Cold War, the Soviet Union's invasion of Afghanistan, and the nuclear confrontation of the 1980s, it continued to supply natural gas. However, in recent times, Vladimir Putin's effort to use natural gas as a geopolitical tool to coerce Europe has so far failed, despite the huge costs of subsidising expensive alternatives to Gazprom's supplies.

Even though Russia has made short-term gains from high fossil fuel prices, earning 28% more revenue than before the war, it has lost its main natural gas market in Europe and is having to search for new buyers elsewhere in order to avoid economic collapse and wasted investments[liii].

It is receiving lower prices for its oil, its upstream industry faces constraints on technology and finance needed to sustain production levels in the longer-term, and its prospects for being a major exporter of nuclear technology or hydrogen have been badly damaged or eliminated.

Russia has found some success in China, mainly 30-year natural gas supply deal through the first Power of Siberia Pipeline signed in 2019. Still global energy markets have fundamentally changed, with new energy deals, renewables on the rise, and government regulators and consumers all too aware of the dynamics and fragility of global energy supply chains[liv]. During Xi Jinping's visit to Moscow in March 2023, Vladimir Putin apparently hoped to sign a further major natural gas supply deal, but China remains coy. It does not wish to become over-dependent on Russian natural gas, and in any case, any new pipeline would take years to construct, cost many tens of billions of dollars, and would achieve much lower realised prices in China than Russia has been used to collect from Europe.

There are still many uncertainties in the near future, as the situation appears fragile for energy markets, particularly across Europe. However, we can draw a few important conclusions.

Firstly, it remains to be seen how big the rebound in Chinese oil demand is in 2023. The well-supplied market at the start of this year could quickly tighten as Western sanctions affect Russian production and exports, despite the relief provided by the G7 oil price cap. Other geopolitical risks, such as an Israeli and/or US response to Iran's expanding nuclear enrichment, could interrupt non-Russian oil exports.

Secondly, Russia could eliminate its remaining natural gas supplies to Europe in 2023. And as China re-opens following the ease in COVID-19 restrictions in 2022, Chinese natural gas demand may rebound. A hot, dry summer and/or a cold winter in either or both of these countries would push up gas demand. These market dynamics will ramp up competition for LNG supplies between European and Asian buyers, which could make things even more challenging for importers in the developing world with less purchasing power. The LNG market is also vulnerable to supply disruptions for political or technical reasons.

And thirdly, whilst the energy crisis is far from over, the recently mild winter season of 2022 / 2023 has bought policymakers time to implement structural changes through bold policies that enable faster deployment of renewables and nuclear generation, which will help insulate their respective energy systems against future volatilities. Ceteris paribus, Europe at least is much better-placed for

reasonably affordable and secure energy than in 2022, and that situation will improve further up to 2025-6 when substantial new LNG supplies arrive on the world market.

A year into the conflict, it can be concluded that Russia played its energy card strongly and it did not benefit from it. The country now faces the likelihood of further declines in oil & gas output in 2023 and a permanent loss of standing in the energy world. It has not only lost a major customer in Europe, but also access to key technologies and financing that were crucial to its domestic energy production.

Russian oil and petroleum product exports to Europe have nearly dried up as embargos are now in full effect. It may struggle to replace these supplies with other customers and has already signalled a production cut from March 2023[lv]. Russia's share of the global natural gas trade is set to halve from 25% in 2021 to 13% in 2023[lvi]. And its share of the European natural gas demand is set to decline from 40% to just 10%[lvii]. Its hopes of developing nuclear power and possibly hydrogen exports to supplement hydrocarbon earnings have suffered a likely terminal blow.

Given that the energy sector is the backbone of the Russian economy, it is not a surprise that its fiscal deficit is widening, as rising military expenditure and subsidies to its population exceed its energy export revenues. This is not sustainable, and will eventually limit Russia's war-making capability and possibly its will to continue the fight with the current intensity. But, even following a cessation of hostilities, peace, even a change in the Russian political system, its legacy customers will not forget this episode.

APPENDIX

i. The EU Ban on Russian Oil: Crude Implications for the Middle East, Columbia Center on Global Energy Policy, 15 February 2023 (https://www.energypolicy.columbia.edu/publications/the-eu-ban-on-russian-oil-crude-implications-for-the-middle-east/)

ii. Russia's war with Ukraine offers critical lessons for global energy markets, CNBC, 2022 (https://www.cnbc.com/2022/03/02/russia-ukraine-war-lessons-for-global-energy-markets.html)

iii. 6 ways Russia's invasion of Ukraine has reshaped the energy world, World Economic Forum, 2022 (https://www.weforum.org/agenda/2022/11/russia-ukraine-invasion-global-energy-crisis/)

iv. Monthly Oil Market Report - March 2023, OPEC (https://momr.opec.org/pdf-download/)

v. Russia sanctions: What impact have they had on its oil and gas exports, BBC News, 2023 (https://www.bbc.com/news/58888451)

vi. G7 to hold off revising Russian oil price cap this week - EU officials, Reuters, 2023 (https://www.reuters.com/business/energy/g7-hold-off-revising-russian-oil-price-cap-this-week-eu-officials-2023-03-20/)

vii. First consignment of Russian crude oil to arrive in Pakistan next month, Indian Express, 2023 (https://indianexpress.com/article/pakistan/russian-oil-in-pakistan-first-consignment-to-arrive-in-pakistan-next-month-8481214/)

viii. Russia sanctions: What impact have they had on its oil and gas exports, BBC News, 2023 (https://www.bbc.com/news/58888451)

ix. Sanctions on Russian oil are having the 'intended effect,' IEA says, CNBC, 2023 (https://www.cnbc.com/2023/02/16/sanctions-on-russian-oil-are-having-the-intended-effect-iea-says.html

x. Factbox: How the EU ban on Russian oil imports affects oil flows, Reuters, 2023 (https://www.reuters.com/business/energy/how-eu-ban-russian-crude-affects-oil-flows-2023-02-27/)

xi. Oil Market Report - February 2023, International Energy Agency (https://www.iea.org/reports/oil-market-report-february-2023)

xii. Oil Market Report - February 2023, International Energy Agency (https://www.iea.org/reports/oil-market-report-february-2023)

xiii. Russia's War on Ukraine, International Energy Agency (https://www.iea.org/topics/russias-war-on-ukraine?gclid=EAIaIQobChMIzIb7zJbv_

QIVj_pRCh0fqwJbEAAYASAAEgIVyvD_BwE)
xiv. Gas Market and Russian Supply, International Energy Agency (https://www.iea.org/reports/russian-supplies-to-global-energy-markets/gas-market-and-russian-supply-2)
xv. European natural gas imports, Bruegel, 2023 (https://www.bruegel.org/dataset/european-natural-gas-imports)
xvi. How to Avoid Gas Shortages in the European Union in 2023, International Energy Agency, 2023 (https://iea.blob.core.windows.net/assets/96ce64c5-1061-4e0c-998d-fd679990653b/HowtoAvoidGasShortagesintheEuropeanUnionin2023.pdf)
xvii. How to Avoid Gas Shortages in the European Union in 2023, International Energy Agency, 2023 (https://iea.blob.core.windows.net/assets/96ce64c5-1061-4e0c-998d-fd679990653b/HowtoAvoidGasShortagesintheEuropeanUnionin2023.pdf)
xviii. How to Avoid Gas Shortages in the European Union in 2023, International Energy Agency, 2023 (https://iea.blob.core.windows.net/assets/96ce64c5-1061-4e0c-998d-fd679990653b/HowtoAvoidGasShortagesintheEuropeanUnionin2023.pdf)
xix. Eastern Mediterranean Deepwater Gas to Europe: Not Too Little, But Perhaps Too Late, Columbia Center on Global Energy Policy, 21 March 2023 (https://www.energypolicy.columbia.edu/publications/eastern-mediterranean-deepwater-gas-to-europe-not-too-little-but-perhaps-too-late/)
xx. Opportunities to Strengthen the Natural Gas Sector in the Iraq Kurdistan Region: A Step Towards a Cleaner and More secure Energy Future, Qamar Energy, 8 September 2021 (https://www.qamarenergy.com/sites/default/files/Qamar%20Energy%20-%20The%20Natural%20Gas%20Sector%20in%20the%20Iraq%20Kurdistan%20Region%20-%20September%202021.pdf)
xxi. Renewable Power Generation Costs in 2002, International Renewable Energy Agency, 2021 (https://www.irena.org/publications/2022/Jul/Renewable-Power-Generation-Costs-in-2021#:~:text=The%20lifetime%20cost%20per%20kWh,at%20least%20USD%2055%20billion.)
xxii. Renewable Power Generation Costs in 2002, International Renewable Energy Agency, 2021 (https://www.irena.org/publications/2022/Jul/Renewable-Power-Generation-Costs-in-2021#:~:text=The%20lifetime%20cost%20per%20kWh,at%20least%20USD%2055%20billion.)
xxiii. Renewable Energy Sees Record Increase in 2022, Agency Says, Voice of America, 2023 (https://www.voanews.com/a/renewable-energy-sees-record-increase-in-2022-agency-says-/7015384.html)
xxiv. EU: Almost 2/3 of Europe hit by drought, DW, 2022 (https://www.dw.com/en/almost-two-thirds-of-europe-is-affected-by-drought-eu/a-62900931)
xxv. Drought, power cuts worsen China's supply snarl, DW, 2022 (https://www.dw.com/en/drought-and-power-shortages-worsen-chinas-supply-chain-snags/a-62928037)
xxvi. Renewables Will Overtake Coal by Early 2025, New York Times, 2022 (https://www.nytimes.com/2022/12/06/climate/iea-renewable-energy-coal.html)
xxvii. Renewables 2022: Analysis and Forecast to 2027, International Energy Agency (https://iea.blob.core.windows.net/assets/ada7af90-e280-46c4-a577-df2e4fb44254/Renewables2022.pdf)
xxviii. Energy Technology Perspective 2023, International Energy Agency (https://iea.blob.core.windows.net/assets/a86b480e-2b03-4e25-bae1-da1395e0b620/EnergyTechnologyPerspectives2023.pdf)
xxix. This chart shows which countries produce the most lithium, World Economic Forum, 2023 (https://www.weforum.org/agenda/2023/01/chart-countries-produce-lithium-world/)
xxx. How the War in Ukraine Is Further Disrupting Global Supply Chains, Harvard Business Review, 2022 (https://hbr.org/2022/03/how-the-war-in-ukraine-is-further-disrupting-global-supply-chains)
xxxi. Grid-Scale Storage: Tracking Report, International Energy Agency (https://www.iea.org/reports/grid-scale-storage)
xxxii. Grid-Scale Storage: Tracking Report, International Energy Agency (https://www.iea.org/reports/grid-scale-storage)
xxxiii. Ukraine war | Green hydrogen 'now cheaper than grey in Europe, Middle East and China': BNEF, Recharge, 2022 (https://www.rechargenews.com/energy-transition/ukraine-war-green-hydrogen-now-cheaper-than-grey-in-europe-middle-east-and-china-bnef/2-1-1180320)
xxxiv. Ukraine war | Green hydrogen 'now cheaper than grey in Europe, Middle East and China': BNEF, Recharge, 2022 (https://www.rechargenews.com/energy-transition/ukraine-war-green-hydrogen-now-cheaper-than-grey-in-europe-middle-east-and-china-bnef/2-1-1180320)
xxxv. IEA calls for major role for nuclear power in clean energy systems, Nuclear Newswire, 2022 (https://www.ans.org/news/article-4101/iea-calls-for-major-role-for-nuclear-power-in-clean-energy-systems/)
xxxvi. America Just Made a Huge Investment in Next-Gen Nuclear Power, Popular Mechanics, 2020 (https://www.popularmechanics.com/science/a32598099/advanced-nuclear-power-tiny-reactors/)
xxxvii. The world is burning more coal than ever before, new report shows, CNN, 2022 (https://edition.cnn.com/2022/12/16/world/coal-use-record-high-cli-

mate-intl/index.html)
xxxviii. Analysis: Global CO2 emissions from fossil fuels hits record high in 2022, World Economic Forum, 2022 (https://www.weforum.org/agenda/2022/11/global-co2-emissions-fossil-fuels-hit-record-2022/)
xxxix. Global coal demand is set to return to its all-time high in 2022, International Energy Agency 2022 (https://www.iea.org/news/global-coal-demand-is-set-to-return-to-its-all-time-high-in-2022)
xl. Global coal demand is set to return to its all-time high in 2022, International Energy Agency 2022 (https://www.iea.org/news/global-coal-demand-is-set-to-return-to-its-all-time-high-in-2022)
xli. Global coal demand is set to return to its all-time high in 2022, International Energy Agency 2022 (https://www.iea.org/news/global-coal-demand-is-set-to-return-to-its-all-time-high-in-2022)
xlii. China And India Are Buying Russian Crude At A 40% Discount, Oil Price, 2022 (https://oilprice.com/Energy/Energy-General/China-And-India-Are-Buying-Russian-Crude-At-A-40-Discount.html)
xliii. Crisis-hit Sri Lanka snaps up cheap Russian oil, Financial Times, 2022 (https://www.ft.com/content/59e4ff01-f8eb-4ba1-95e9-bcaa76bcbb10)
xliv. U.S. petroleum product exports set a record high in 2022, United States Energy Information Agency (https://www.eia.gov/todayinenergy/detail.php?id=55880)
xlv. Trafigura Posts Record $7 Billion Profit in Blowout Year, Bloomberg, 2022 (https://www.bloomberg.com/news/articles/2022-12-08/trader-trafigura-posts-record-7-billion-profit-in-blowout-year?leadSource=uverify%20wall)
xlvi. MUFG Research: GCC economies to bounce back in 2022, MUFG, 2022 (https://www.mufgemea.com/media/mufg-research-gcc-economies-to-bounce-back-in-2022/)
xlvii. MUFG Research: GCC economies to bounce back in 2022, MUFG, 2022 (https://www.mufgemea.com/media/mufg-research-gcc-economies-to-bounce-back-in-2022/)
xlviii. Gas Market Report, Q1-2023, International Energy Agency (https://iea.blob.core.windows.net/assets/c6ca64dc-240d-4a7c-b327-e1799201b98f/GasMarketReportQ12023.pdf)
xlix. Gas Market Report, Q1-2023, International Energy Agency (https://iea.blob.core.windows.net/assets/c6ca64dc-240d-4a7c-b327-e1799201b98f/GasMarketReportQ12023.pdf)
l. Gas Market Report, Q1-2023, International Energy Agency (https://iea.blob.core.windows.net/assets/c6ca64dc-240d-4a7c-b327-e1799201b98f/GasMarketReportQ12023.pdf)
li. Gas Market Report, Q1-2023, International Energy Agency (https://iea.blob.core.windows.net/assets/c6ca64dc-240d-4a7c-b327-e1799201b98f/GasMarketReportQ12023.pdf)
liii. How the Russia-Ukraine war is changing energy markets, Wood Mackenzie, 2023 (https://www.woodmac.com/news/the-edge/how-the-russia-ukraine-war-is-changing-energy-markets/)
liv. Russia's oil and gas budget revenues grew by 28% in 2022, Enerdata, 2023 (https://www.enerdata.net/publications/daily-energy-news/russian-oil-gas-revenues-increase.html)
liv. Explainer: Does China need more Russian gas via the Power-of-Siberia 2 pipeline, Reuters, 2023 (https://www.reuters.com/business/energy/does-china-need-more-russian-gas-via-power-of-siberia-2-pipeline-2023-03-22/) li. Russia plans hefty oil export cuts for March, Offshore Technology, 2023 (https://www.offshore-technology.com/news/russia-plans-heft-oil-export-cuts-in-march/#:~:text=Russia%20plans%20to%20cut%20its,oil%20market%20have%20told%20Reuters.)
lvi. Gas Market Report, Q1-2023, International Energy Agency (https://iea.blob.core.windows.net/assets/c6ca64dc-240d-4a7c-b327-e1799201b98f/GasMarketReportQ12023.pdf)
lvii. Gas Market Report, Q1-2023, International Energy Agency (https://iea.blob.core.windows.net/assets/c6ca64dc-240d-4a7c-b327-e1799201b98f/GasMarketReportQ12023.pdf)

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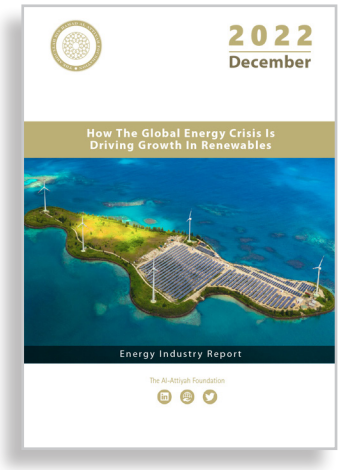

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(QRCODE)

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