

Commentary

Energy Transition Amid Converging Global Energy Crises

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In this commentary, we provide a discussion of the factors that have led to the ongoing spike in natural gas prices. We then discuss the potential short- and long-term implications for the global energy transition and for users of natural gas, both residential and industrial. The analysis highlights that although the world has debated reducing investment in fossil fuels to meet the Paris Agreement goal of keeping global warming below 1.5° C, major energy consumers have been calling for an increase in oil and gas production to meet immediate energy needs and curb the current price trend. While renewables have promise for enhancing energy security, the current energy crisis has revealed that at the present-day scale, renewable energy investments are not able to meet ongoing energy needs, forcing countries to again unlock hydrocarbon fuel sources, such as coal, and putting the global energy transition on hold. The paper concludes with recommendations for policies that enable clean energy developments to be unlocked amid strained geopolitical contexts to avoid future vulnerability to similar crises.

1. Soaring Gas Prices: Combined Effects of COVID-19 Economic Recovery and the Russia-Ukraine War

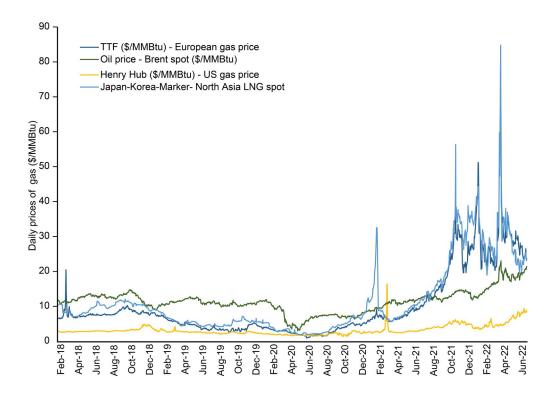
Global energy markets are experiencing an unprecedented confluence of events that are driving up gas prices and adding further complexity to the already uncertain prospects for post-COVID-19 global economy recovery.

The absolute levels of gas demand were reduced in 2020 due to the general decline in primary energy demand caused by economic disruption caused by attempts to contain the COVID-19 pandemic. However, the share of gas in primary energy continued to increase, hitting a record high of 24.7% (B.P. 2021).

The rollout of COVID-19 vaccinations since 2021 has supported economic recovery and led to a rebound in energy demand. The exceptional worldwide economic recovery has caused logistical constraints and low inventories, which have sent gas prices soaring to unprecedented levels. Liquefied natural gas (LNG) spot prices and natural gas prices have reached astronomical levels this year. During the first week of October, they stood at \$56/MMBtu (million British thermal units) in Asia and approximately \$40/MMBtu in Europe. This represents a more than twentyfold jump in prices over the summer compared to 2020 levels (Figure 1).

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Figure 1. Daily natural gas, liquefied natural gas (LNG) spot, and crude oil prices from January 2018 to October 2021. On average, the current gas market crisis has driven prices up by approximately 300% in Europe, 254% in Asia, and 87% in the U.S. compared to 2020 levels.



Source: Created by the authors using Bloomberg and S&P Platts data.

These peak levels are driven by a combination of exogenous factors, including a strong post-COVID-19 economic recovery, low levels of hydroelectric and wind power in some regions, unprecedented weather conditions that boosted demand for heating and cooling, carbon taxes, and a vicious commodity cycle that relies on gas and procurement issues in the coal and gas markets.

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Among the factors responsible for the price rise is the overall reduction in investment in gas-related infrastructure and maintenance since the COVID-19 pandemic. This situation has been exacerbated by supply constraints. The LNG supply has not been able to keep up with the increase in LNG demand outside Asia caused by a very cold winter and a strong rebound in industrial activity. While LNG capacity has increased significantly, particularly in the U.S., maintenance delays caused by the COVID-19 pandemic, supply chain disruption, unplanned outages, project delays, unplanned repair work, and temporary curtailments have tightened the gas market and limited production in countries such as Algeria, Australia, Nigeria, and Norway (Fernández Alvarez and Molnar 2021).

The price crunch has spread well beyond the gas sector to other fossil fuels, including oil and coal. Sharp spikes in natural gas prices have pushed major consumers, including the U.S., Asia, and Europe, to substitute coal for natural gas for power generation. Europe and China are also experiencing historically high coal prices. Global coal prices are approximately five times higher than they were in 2020, and power plants in India and China, the two major consumers of coal in the world, have very low inventories (Fernández Alvarez and Molnar 2021). Current oil inventory levels are low, amplifying current potential oil price volatility. The observed global oil inventories declined by 45 million barrels in March 2022 and are currently 1.2 billion barrels lower than in June 2020.

The OECD commercial inventory is projected to total 2.746 million barrels per day (mb/d) at the end of 2022, 156 mb/d lower than at the end of 2022 (EIA, 2022).

This price crunch has been exacerbated by the outbreak of Russia-Ukraine crisis in February 2022 The price crunch has been exacerbated by the outbreak of the Russia-Ukraine crisis in February 2022. Russia's invasion of Ukraine in February triggered many governments and companies to impose financial sanctions on Moscow in a bid to pressure the Russian government to stop fighting and withdraw its forces (Funakoshi, et al 2022). Joined by Britain, Australia, and Canada, the U.S. Followed up on financial sanctions by announcing a ban on imports of Russian oil, natural gas, and refined products. Others have signaled an intention to cut back on Russian supplies, if not end them altogether, in the near future. Many European nations, the chief destination for Russian hydrocarbons - they import approximately 40% of Russian gas and 35% of its crude oil - have telegraphed their intentions to cut back sharply sooner rather than later. Germany has frozen the Nord Stream 2 gas pipeline project, which was designed to double the flow of Russian gas to the E.U. through Germany (Marsh and Chambers, 2022). Others, including the Czech Republic, Bulgaria, and Italy, have returned to using coal in order to wean themselves off Russian gas and oil. Crucially, on May 18, the European Commission proposed a plan, REPowerEU Plan, that details how to reduce the E.U.'s dependence on Russian gas by two-thirds before the end of 2022 and to become independent from all Russian fossil

fuels "well before 2030" (European Commission, 2022; Taylor, 2022). The proposal has two main aims: to ensure gas supply security while speeding up the deployment of renewables and energy-efficiency measures. These actions have introduced new uncertainties and dynamics into the global energy market, pushing oil prices to new highs and bringing energy security to the forefront – especially for E.U. member countries – and clouding the outlook for the Russian oil industry.

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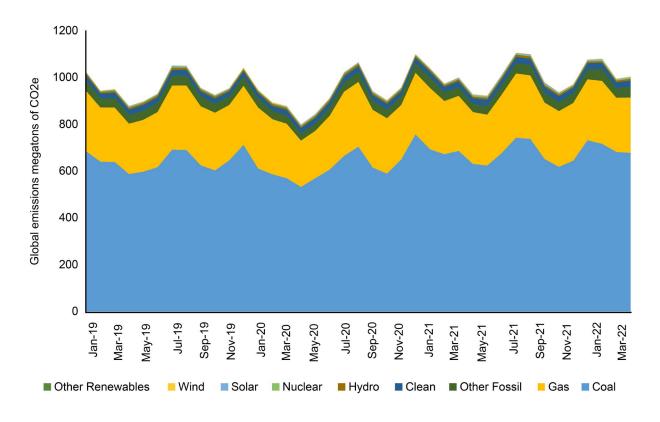
2. Short-term Implications for Global Energy Transition

The ongoing boom in energy prices around the world has led to renewed talk of a gas-price crisis with far-reaching implications. Natural gas has been in the spotlight because gas spot prices in Asia, Europe, and the U.S. have hit unprecedented levels.

The sharp increases in natural gas prices have hit major markets, including the U.S., Asia, and Europe, leading them to substitute coal for natural gas for power generation. This expanded use of coal has led to an increase in the volume of greenhouse gas (GHG) emissions from power generation worldwide (Figure 2).

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Figure 2. Global Emissions from the Power Sector by Source (Megatons of CO2e).



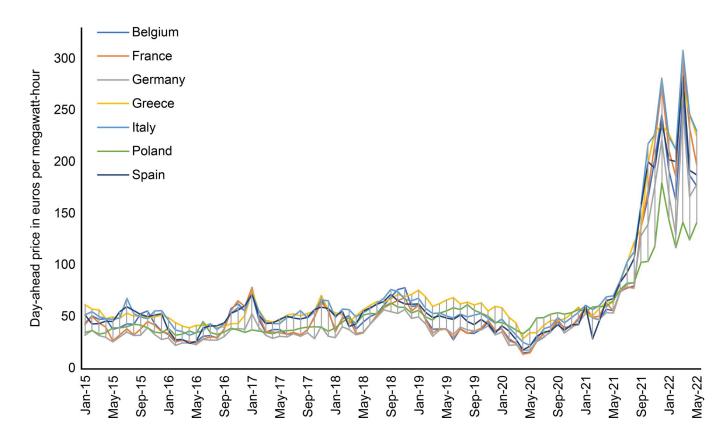
Source: Author calculation using EMBER data, June 2022.



In conjunction with rocketing European carbon prices, the higher prices for gas and coal have caused electricity prices to rise sharply. Wholesale electricity prices surged in the E.U. in 2021, as most countries reached all-time highs in December. The situation was exacerbated in February 2022 by the war in Ukraine, resulting in a new price boom in March 2022 (Figure 3).

Electricity-forward contracts for the end of 2022 and, more importantly, for 2023 have surged in recent weeks, foreshadowing further spikes in utility bills. Forward contracts have, in some instances, surged to record highs, with an increase of approximately 40%. In May 2022, the German one-year forward electricity reference contract averaged 222 euros per megawatthour, edging toward its highest monthly level and exceeding the former peak set in December 2021 at 207 euros per megawatt-hour. Prior to 2021, for the same reference contract, the highest average was 83 euros in July 2008 (Bloomberg, 2022).

Figure 3. Average monthly electricity wholesale prices in selected E.U. member states (in euros per megawatt-hour).



Source: Author calculation using EMBER data.

The imminent concerns in the short term are the impact of price spikes for gas and electricity on consumers' energy bills and potential power outages. The record-high electricity and gas prices may spill over into the long-standing fuel-poverty phenomenon, which is linked to high energy costs, low incomes, and inefficient energy housing (Belaïd 2018; Belaïd, 2021, 2022). In this context, many households are experiencing significant increases in their electricity and gas bills, which is exacerbated by current tariffs in many countries. For example, in France, regulated tariffs contributed to a 29% rise in the average household gas bill in October 2021 compared to January 2019 and a 52% increase compared to January 2021 (CRE 2021).

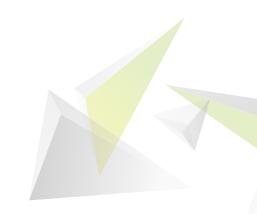
In Germany, where households pay more for electricity than in any other E.U. member state, 4.2 million households will experience an average annual increase of 63.7% in their electricity bill in 2022, while 3.6 million will pay 62.3% more for gas (BBC, 2022). According to the British energy regulator (OFGEM, 2022), the price cap for approximately 22 million households increased by 54%, from £1,277 to £1,971, in April 2022 and is expected to peak at £2,800 in October 2022. In addition, energy bills for prepayment customers rose by £708, from £1,309 to £2,017. The Department for Business, Energy and Industrial Strategy (BEIS) estimated that 13.4% of households in England (3.18 million households) were experiencing energy poverty in 2019. The recent surge in energy costs in the UK could push this figure up to 8.5 million (Bloomberg, 2022). In Ireland, according to the Economic and Social Research Institute (ESRI), recent energy inflation has raised the estimated proportion of households in energy poverty to 29% - above the 23% peak previously recorded in 1994–95 (ESRI, 2022). This estimate reflects energy inflation from January 2021 to April 2022, and an additional 25% increase in energy prices would bring this share to 43%.

Over and above the impact on residential consumers, the turbulence in the gas market has implications for the global economy. For instance, many industrial gas users, such as fertilizer producers (e.g., Badische Anilin und Soda Fabrik (BASF) in Germany and Central Farmers (C.F.) Industries in the U.K.), are having to cease or reduce their activities. In September 2021, C.F. Industries ceased operations at two plants in the U.K. The Austrian chemical manufacturer Borealis and the Norwegian company Yara International also reduced ammonia production (Financial Times 2021). In China, some factories have closed due to electricity shortages (Singh and Zhang 2021).

Under such conditions, it is appropriate for policymakers in Asia and Europe to take urgent measures to ease the burden during periods of short-term energy market turbulence, especially for the most vulnerable consumers, by, for example, providing energy vouchers or temporary relief from certain taxes or fees.

In a continuous war scenario, the search for and switch to alternative fuel supplies are expected to reduce the demand for Russian gas and meet immediate energy needs, especially since permits for and construction of new renewable energy sources, such as wind and solar energy, require a longer time than expanding the existing infrastructure that supports the transport of hydrocarbons.

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Indeed, the energy gap created by the E.U.'s efforts to phase out Russian imports coupled with sanctions from other petroleum companies has triggered governments to announce ambitious renewable energy plans. However, in the short term, renewables and alternative energy sources are not ready to provide a quick fix to meeting the immediate needs of countries and petroleum companies planning to phase out Russian imports. In fact, the energy gap resulting from the Russia-Ukraine crisis has created both opportunities and pressure for oil and gas producers to increase production to fill the gap and help reduce soaring oil and gas prices. For instance, the U.S. has boosted its LNG exports to the E.U. to support the departure from depending on Russian hydrocarbons and to reduce oil prices as much as possible. On April 1, the Biden administration authorized a release of one million barrels per day for the next six months from its Strategic Petroleum Reserve, the largest release in U.S. history. However, as of April 5, no signs of oil price decline had been observed following the U.S. increase in supply. WTI Crude Oil had reached a high of 104.64 USD per barrel, and Brent Crude Oil had recorded 108.80 USD per barrel. Oil prices instead continued to rise, and as of May 8, WTI Crude Oil had reached a high of 110.61 USD per barrel, and Brent Crude Oil had recorded 113.15 USD per barrel.

The U.S. has also sought cooperation from major producers, such as Qatar. In an attempt to push Qatar to participate in filling the gas supply gap, on March 10, the White House designated Qatar a major non-NATO ally of the U.S. Qatar is a non-OPEC member, having terminated its OPEC membership on January 1, 2019, and despite its limited spare capacity, given its long-term contracts with Asia, it started negotiating long-term gas export contracts with some European countries, such as Germany, and signed a long-term LNG deal with Germany on March 20 (Reuters, 2022). Other OPEC-plus members, such as Oman, also started negotiating gas trades with E.U. members, such as France (WAF News Agency, 2022).

In a further attempt to bring prices under control, Mr. Biden visited Saudi Arabia in July 2022. As late as May 2022, OPEC, despite pressure from the U.S. and other countries, had shown no intention of ramping up supply to counter soaring prices. However, in its latest meeting on June 2, the OPEC-plus group agreed to boost production by 648,000 barrels a day in July and August in response to high-level diplomacy from Washington. Mr. Biden is expected to push for further increases when he travels to the East (Al-Sarihi, 2022).

3. Possible Long-term Implications

A typical market reaction to supply disruptions is to turn to alternative energy sources. Hence, coal switching has already taken place in Europe, Asia, and the U.S. However, the coal market is also experiencing shortages because of the spike in electricity demand combined with supply constraints.

While the shift to oil offers a partial way out of the crisis, oil is not largely used in the power generation sector. It accounts for less than 3% of the world's electricity production, and roughly half of that small proportion is situated in the Middle East (B.P. 2021). However, in regard to wind and solar power, there is no silver bullet to increase production according to



demand, as wind power depends on wind levels and solar power relies on cloud cover levels.

Currently, there are two predominant schools of thought regarding the prevailing situation, which are reflected in the evolving natural gas debate. The first sees this experience as further evidence of the urgent need to accelerate the energy transition and decarbonize the global power grid. The second, however, sees in this circumstance concrete evidence that the world is not ready for a rapid transition and that additional gas is necessary in the short and medium term to satisfy the growing global energy demand.

A crucial aspect of the current debate is the affordability and security of supply, particularly in a future context in which renewable energy sources contribute a higher share. The evidence from the current gas-price crisis is that there is a clear likelihood that significant variations and mismatches in supply and demand will drive tight fossil fuel markets. This will, in turn, result in excessive volatility and surges in prices that will also impact electricity markets.

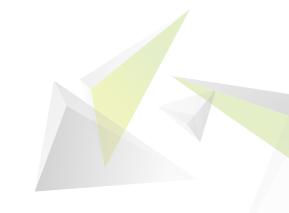
With a worldwide commitment to switching to a clean energy system, industries and policymakers must rethink the energy demand security approach. It is crystal clear that while severe weather events intensify energy demand, renewable energy supplies are likely to be lower than the target levels. The recent Texas outages caused by extreme cold, which left millions of residents without power, illustrate how extreme weather events can threaten energy systems (Morey 2021). Preparing for and anticipating these new risks is essential to minimizing energy supply disruptions and future price surges.

However, in the long term, renewables and other clean energy technologies could play a more prominent role in enhancing countries' energy security while helping meet their existing climate goals. In a scenario wherein oil and gas prices continue to rise, renewables and other clean technologies are expected to be more attractive than conventional sources. Recent events have driven individual governments to signal their plans to accelerate the transition to renewable energy and reduce their use of natural gas. On February 28, for instance, Germany announced a plan to produce 100% of its energy from renewable sources by 2035, and France announced plans to end subsidies for gas heaters and offer more money for households to install electric heat pumps. The U.K. anticipates a rapid expansion of wind and solar power in a strategy that also includes plans to build more nuclear plants. The European Commission, the E.U.'s executive arm, released a full proposal in May 2022 detailing how it plans to reduce its dependence on Russian natural gas. An earlier outline of the plan, released in March, suggested that the E.U. could pull forward some of its renewable energy and efficiency targets from a landmark climate change strategy published last year (Dalton and Hua, 2022).

4. Conclusions and the Way Forward

This perspective paper highlights that even as governments pledge to pursue a green economic recovery and enhance energy security, the Currently, there are two predominant streams of thought regarding the prevailing situation, and these are mirrored in the evolving natural gas debate

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current scale and readiness level of alternative energy technologies have proved unreliable in filling the energy security gaps created by the postpandemic economic recovery compounded by the consequences of the ongoing war between Russia and Ukraine. That is, in a context of global energy transition where electrification and renewables are booming, demand for expanded capacity will remain for the foreseeable future and will very likely be gas based in the short to medium term. Accordingly, short- and medium-term energy needs will continue to rely on fossil fuels. Fossil fuels will help ensure supply flexibility by bridging the intermittency of renewables and will presumably continue to set power prices.

The ongoing turmoil poses the question of whether such volatile episodes of sky-high gas prices will become more frequent in the future. Owing to its large storage capacity, its ability to shift between coal and gas, and the flexibility of its pipeline providers, Europe was able to some extent to play the role of a balancing market for the LNG world market. Nonetheless, coal-fired production will be reduced in Europe with the increasing share of renewable power and rising carbon prices. This suggests that the resilience of the European gas market to global disruptions could be weakened, which would put the continent at greater risk of price volatility.

Energy policymakers should anticipate the emerging risks associated with renewable supply intermittency

As climate resilience should be a cornerstone of future energy policy, this is a breakthrough moment for policymakers to consider the actual facts and implications of the energy transition. It is a moment in which they can design a new climate resilience paradigm, considering the potential of the different available options to promote a resilient and sustainable energy system. Energy policymakers should anticipate the emerging risks associated with renewable supply intermittency. Therefore, the power market needs additional flexibility, which can be achieved through technologies such as batteries, demand-side management, and eventually nuclear and hydrogen energy. Beyond the current soaring energy prices, a revival of interest in energy efficiency and a focus on poorer end users would help in the implementation of an inclusive energy transition process and ensure a sustainable energy supply. Accordingly, we recommend the following:

Decarbonize national hydrocarbon sectors. As fossil fuels will continue to play a role as a bridge fuel in the energy transition and in enhancing energy security in the short to medium term, governments and the private sector should scale up investments that decarbonize the hydrocarbon sector, including the expansion of carbon capture, utilization, and storage (CCUS) technologies.

Seek greening imported hydrocarbons while diversifying supply sources. The ongoing energy market turbulence reveals that diversifying imported energy supplies is one of the short-term solutions to reinforcing energy security. As both importers (such as the E.U. countries) and exporters (such as the OPEC-plus group) are committed to decarbonizing their hydrocarbon economies in the long term, immediate greening of exported hydrocarbon supplies is a win-win opportunity for both exporters and importers to achieve their Paris Agreement commitments. This can be done through investing in hydrogen, as natural gas can be converted into hydrogen and/or ammonia. Such efforts will support the energy transition on both sides.



Support innovation in clean energy technologies. The COVID-19 crisis and Russia-Ukraine crisis have more than ever revealed the importance of the localization of energy technologies. As the crises have revealed that the current scale of renewable energy technologies is not sufficient to meet immediate energy needs, governments should focus on supporting energy innovation systems to enhance the localization of clean energy technologies and avoid future vulnerability to shortages in energy supplies.

Green infrastructure. The increasing energy demand and countries' attempt to lower reliance on external energy exports have pushed energy importers and exporters to navigate building new energy transport infrastructures, such as LNG terminals and pipelines. Countries should seize the opportunity to ensure that new energy infrastructure is climate-compatible and supports long-term energy decarbonization plans, such as the storage and transport of hydrogen.

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About the Project

This paper is part of the ongoing project KAPSARC Buildings Energy Efficiency. The primary purpose of this project is to implement a holistic approach over the whole value chain to identify low-energy demand pathways in the building sector needed to meet the challenges associated with reducing energy demand emissions in Saudi Arabia. The project expects to cover a broad range of topics using innovative approaches and empirical studies to answer the following questions: (i) What are the challenges, barriers, and drivers of improving building energy efficiency in Saudi Arabia?; (ii) What are the key enablers (investment, finance, behavioral interventions, etc.) for building energy efficiency in the Kingdom? How can we effectively federate and engage with the whole community of stakeholders and accelerate the adoption of new business models for energy-efficient buildings in the Kingdom?; and (iii) What are the critical social and economic benefits of energy-efficiency investments in buildings, and who will benefit from these investments?

About KAPSARC

KAPSARC is an advisory think tank within global energy economics and sustainability providing advisory services to entities and authorities in the Saudi energy sector to advance Saudi Arabia's energy sector and inform global policies through evidence-based advice and applied research.

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