Gas Market Lessons from the 2022-2023 Energy Crisis

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Abstract

The 2022-2023 energy crisis tested the resilience of the global gas and LNG markets with the most severe gas supply shock in history. During the crisis, natural gas-importing markets around the world felt the pressures of record-high gas prices, including the scale-back in access to energy, the impediment to economic activity and the extra burden on government budgets. Market responses varied but governments were quick to react as the challenges of security of supply became apparent. Post-crisis, markets must continue to adapt as the effects of the crisis continue to influence security of gas supply. Taking stock of this new situation and how to approach it will be key to improving security of gas supply and enhancing the collective resilience to potential future natural gas market shocks. This report aims to do just that, highlighting five key gas market lessons learned from the crisis and their role in shaping a more secure energy future.

Introduction

Over the course of 2022 and 2023, the largest natural gas supply shock in history unfolded, developing from seemingly regional dynamics into a global shockwave in gas and wider energy markets. The crisis has yet to be entirely resolved in the 3 years that have since passed. However, the post-crisis gas market paradigm has started to emerge, making it possible to draw lessons from the most acute phase of the crisis that can be transposed from one region or market to another, or that can be achieved through collective action across the wider gas market. While gas dependency can be reduced by accelerating the deployment of renewable power generation technologies and electrification of end-uses, the focus of this report is on gas markets. In conjunction with countries' long-term energy and decarbonisation objectives, these lessons will be key in enhancing preparedness for future gas market crises.

The first lesson is that the global gas market has entered a structurally (and geopolitically) more fragile environment following the 2022-2023 supply shock. Despite fast reorganisation of available liquefied natural gas (LNG) volumes in response to the loss of Russian pipeline flows in Europe, LNG trade flexibility did not equate to compensating lost volumes in globally traded gas. With less natural gas swing production capacity available to the market – namely as a result of the sharp drop in Russian supply to Europe – developing alternative flexibility and reserve options in the global gas and LNG market will be essential in better preparing for future gas supply shocks.

Second, although the concurrent needs of the world's two largest LNG import regions – Asia and Europe – led to zero-sum competition for LNG volumes at the peak of the 2022-2023 crisis, fostering co-operation and co-ordination among like-minded importers and responsible suppliers can help ease the detrimental effects of competitive pressure from future shocks. Working towards the relevant co-ordination mechanisms in a time of benign market conditions is essential in reducing uncertainty and enhancing predictability around the balancing of the global gas market in crisis periods.

Third, the crisis highlighted the role of infrastructure redundancy in managing supply disruptions effectively. Infrastructure remains the backbone of liquid and flexible energy markets, and in the post-crisis market environment energy infrastructure needs are likely to be greater to support security of supply in a more fragile gas market context. Evaluating the associated benefits and costs will be key in mobilising the right energy infrastructure investments and capitalising on their redundancy value in strengthening preparedness for future market shocks.

Fourth, the supply shock showed that taking a strategic approach to building supply portfolios, including the use of term contracts, can mitigate price and supply risks during emergencies. The composition of market players' LNG supply portfolios played a central role in shaping the risks and burdens borne by countries, their economies and their citizens. Elements such as expectations of future demand, the purchasing power of a client base or varying degrees of appetite for risk mean that contracting strategies vary across entities. The contrast in the challenges faced by different countries during the crisis highlights how the structure of supply portfolios – notably with respect to contract length and pricing terms – remains a determining factor in managing supply shocks and market movements.

Finally, the 2022-2023 crisis showed the significance of energy affordability in ensuring security of supply. Global gas prices skyrocketed to record-breaking highs during the crisis, effectively rendering supply inaccessible to some consumers and placing significant fiscal and economic strain on countries around the globe. Sharing best practices and increasing transparency around the dual implementation of affordability measures and demand response tools will enhance the global market's collective capacity to tackle future supply shocks and better prevent the detrimental effects of demand destruction.

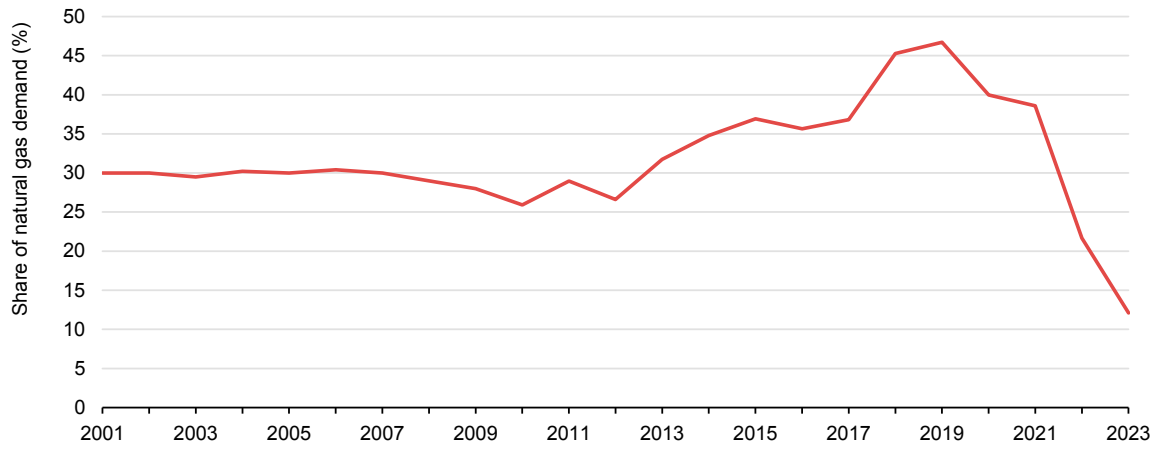
Anatomy of a natural gas crisis

Sudden and drastic reduction in Russian pipeline gas deliveries to Europe

In the run-up to the gas supply shock, Russian natural gas (pipeline and LNG combined) accounted for a growing share of European gas supply. Prior to 2010, Russian supply made up a relatively steady 30% of the European Union's gas supply. However, the combination of plateauing demand and rapid decline in EU domestic production, which started in the early 2010s (linked to the decision to phase out the historical Groningen gas field in the Netherlands), led to growing dependency on gas imports across the European Union. The Russian share of the European Union's gas supply grew from close to 30% in 2010 to over 45% by 2019 – a significant concentration in gas supply for the bloc.

This increased supply concentration and reliance on Russian gas occurred against a particular geopolitical backdrop: Previous breaches in energy security, including the temporary interruptions of Russian pipeline gas supply to Ukraine in both 2006 and 2009, had downstream implications for EU energy security, prompting EU legislation on supply security and gas market liberalisation.

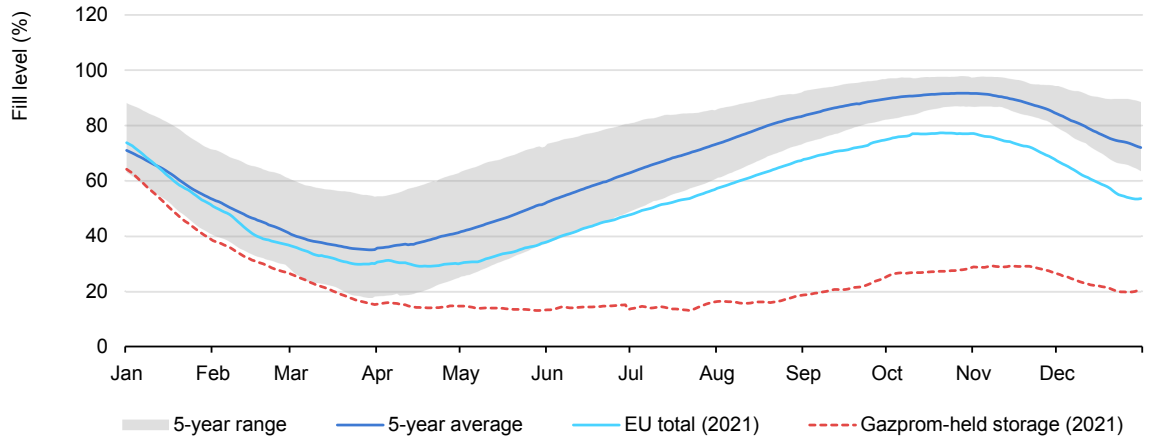
Share of Russian natural gas in EU demand, 2001-2023



The unravelling of this dominant Russian supply position began ahead of the 2021/22 heating season through two significant and related developments. Russian pipeline flows to Europe fell by about 25% year on year in Q4 2021,

notably as a result of Gazprom's strategy to halt short-term and spot gas sales to EU buyers via its Electronic Sales Platform (which Gazprom set up in 2018 to sell spot volumes on the European market and used extensively to sell its surplus gas in 2019-2020). Simultaneously, Gazprom did not replenish EU underground gas storage capacities that it owned or had booked, leading to a significant divergence in filling pattern between Gazprom-held and other capacities. As a result, overall EU underground storage fill was at its lowest point in nearly a decade by the end of the 2021 injection season, uncovering a vulnerability in the EU market and contributing to an environment of "artificial scarcity".

EU underground natural gas storage levels, 2021



Source: IEA based on data from AGSI (2025), Remit Storage Data.

The decline in Russian piped gas supplies accelerated steeply over the course of 2022, against the backdrop of the Russian Federation's full-scale invasion of Ukraine. In response to EU sanctions on its central bank (itself a measure in response to the Russian Federation's invasion of Ukraine), the Russian Federation (hereafter "Russia") attempted to impose a rouble payment system on EU buyers for existing contracts. This action led to unilateral cuts in exports and Russian sanctions on certain buyers as EU member states contested the legality of the move.

Furthermore, by October 2022 only three pipeline routes connecting Russia to Europe (the Ukrainian transit route, Blue Stream and TurkStream) remained functional after Russia's decision to cease transit through the historic Yamal-Europe pipeline (May 2022) – through Belarus and into Poland – and the still unelucidated acts of sabotage on the Nord Stream and Nord Stream 2 pipelines (September 2022), which connect directly to Germany through the Baltic Sea. Following, and linked to, these acts of geopolitical reprisal, Russian piped gas

exports to OECD Europe fell by an estimated 50% (83 bcm) year on year in 2022, dropping to their lowest levels since the mid-1980s.

The sheer magnitude and pace of the cut in piped natural gas – particularly in the context of growing European supply concentration in the hands of one country (Russia) and company (Gazprom) – lent gravity to the situation, denting the European gas balance and introducing an unprecedented element of uncertainty in the market. Illustrating the wide range of potential vulnerabilities to modern energy markets, geopolitical instability – far removed from market fundamentals – proved to be a potent and unpredictable element of disruption, particularly when added to the fault-lines of increasing supply concentration.

Knock-on effects on the global LNG market

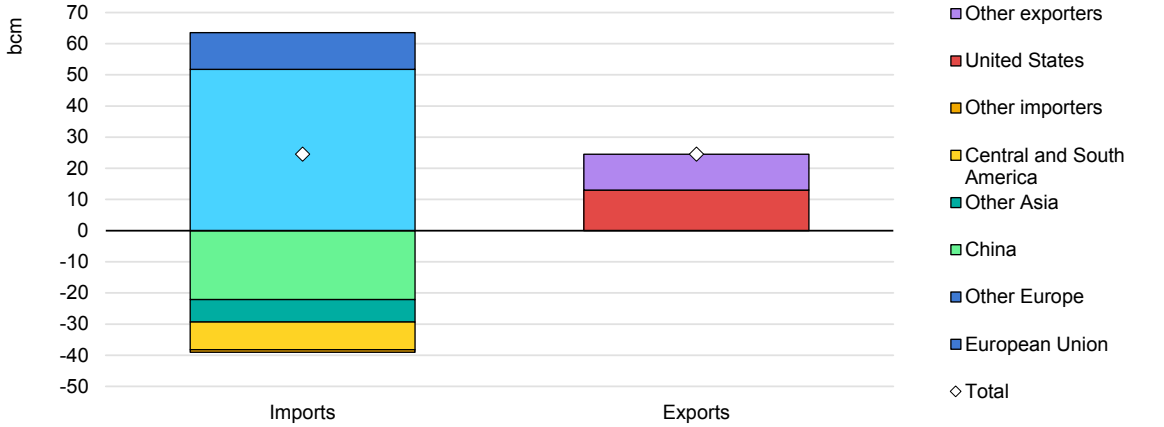
Although the natural gas supply crunch in Europe started as what could have appeared to be a regional issue, its truly global nature and repercussions were felt without delay: The global LNG market proved to be a highly reactive link between regional fundamentals and global gas dynamics. A decade of increasing liquidity and flexibility conferred on LNG trade the ability to be a key global gas market balancing lever.

As Russian pipeline gas deliveries to Europe fell precipitously in 2022 and 2023, European buyers scrambled to secure alternative supply volumes. However, supply-side flexibility from other legacy pipeline suppliers proved limited. Pipeline flows from Norway rose by just 3% (4 bcm) in 2022, and although deliveries from Azerbaijan increased by 40% as the Trans Adriatic Pipeline operations reached full nameplate capacity, this represented only 3 bcm of incremental supply. Combined flows from Algeria and Libya fell by 10% (4 bcm), linked to availability constraints. In total, non-Russian pipeline supply to Europe increased only marginally compared with the loss in Russian volumes.

Consequently, Europe turned to the LNG market to compensate for a share of lost Russian pipeline supply, sparking a significant reconfiguration in global LNG trade flows. In 2022, European LNG imports grew by 64 bcm (over 60%) year on year, effectively replacing Russian pipeline flows as the primary natural gas supply source for the continent. However, with global incremental LNG supply totalling just 25 bcm over the same period, Europe's growing appetite for LNG meant that cargoes had to be redirected from other importing markets.

In 2022, a share of LNG volumes destined for Asia and other markets rerouted for Europe almost instantly as European spot buying accelerated in response to the supply shock. By the end of the year, increased European buying had been accommodated by a nearly 30-bcm (or 8%) drop in Asian LNG imports and a 9-bcm (or 38%) drop in Latin American LNG imports.

Year-on-year change in global LNG exports and imports by key region, 2021-2022



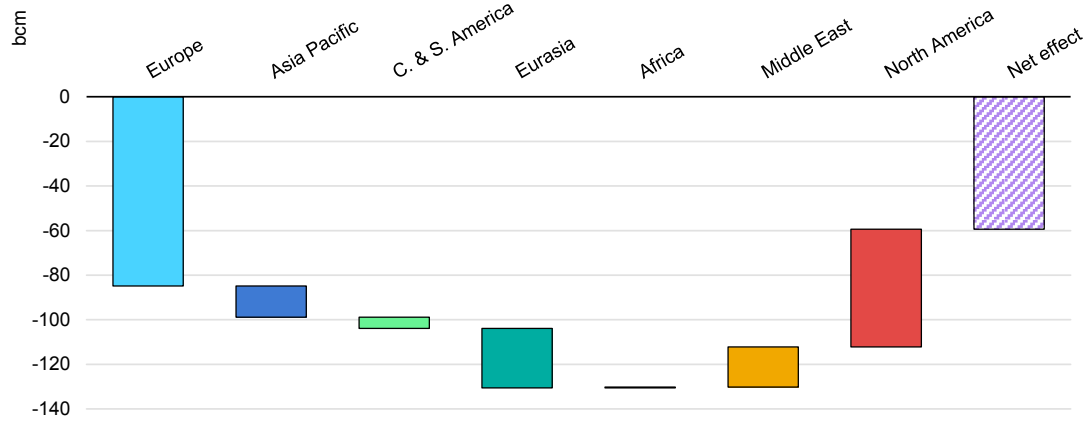
Note: bcm = billion cubic metres.
Source: IEA analysis based on ICIS (2025), ICIS LNG Edge.

Despite LNG market reactivity helping rebalance the global gas market in 2022, globally traded natural gas volumes fell as a result of the lower Russian pipeline gas deliveries to Europe. These lost volumes had no way of reaching alternative demand markets, thus constraining the global gas balance. Apart from a redirection of LNG flows, record high global gas prices did little to prompt a genuine supply-side response, given the tendency of liquefaction facilities to run near nameplate capacity (leaving little upside flexibility) and the absence of easily marketable spare production capacity elsewhere. This meant that the market had to find other ways of balancing – primarily through demand curtailment.

The global gas supply crunch proved significant not only because of the gas volumes lost by Russia's turndown in exports to Europe but also because of the loss of price-responsive supply that these exports represented. Russian upstream assets have the technical capacity – and European long-term contracts had the necessary flexibility – to allow for monthly and annual delivered volumes to fluctuate in response to demand dynamics and the price competitiveness of alternative supply. The arbitrage between European LNG imports and pipeline imports from Russia was at times the balancing act to both the European and global markets.

In the absence of significant supply-side response to the market imbalance during the crisis, demand emerged as the ultimate balancing variable, not only in those markets from which LNG was redirected but also in those markets that registered record high LNG imports.

Changes in natural gas demand by region, 2022 vs. 2021



Note: bcm = billion cubic metres; C. & S. = Central and South.

Although global gas demand reductions were highly concentrated in Europe, Asian markets also experienced a significant scale-back in gas demand. As a whole, Asian demand fell by only 2% (compared with 14% in Europe). However, demand in smaller, more economically vulnerable markets in Asia (also among those most exposed to spot LNG markets) fell by about 7% from 2021 levels. The background of the change in LNG imports in each region is investigated in the following chapter.

Unique characteristics of LNG market

The global LNG market has grown in heft from below 10% of global gas demand in 2015 to about 13% in 2024, broadening the inter-regional reach of gas-producing and gas-consuming markets. Gas volumes that were previously locked into regional dynamics are now increasingly active in shaping global fundamentals. Furthermore, while LNG trade has historically been dominated by end-to-end, oil-indexed, long-term contracts, trading modalities have also evolved considerably. A wider variety in price formulae and flexibility in both contract structure and the logistical reach of LNG supply have thus emerged.

From 2010 to 2021, the share of short-term and spot-traded volumes in the global LNG market rose from about 19% to 37%, notably in relation to the rapid ramp-up of US LNG exports from 2015 onwards and the rise of an alternative contract model associated with these volumes. While legacy long-term contracts have remained a structuring contractual model in global LNG trade, US LNG exports introduced a growing share of cargoes sold on a “free on board” basis, introducing more flexibility in cargo delivery. These contractual terms matched a simultaneous rise in portfolio player activity, aggregating volumes and optimising contractual portfolios to serve LNG demand around the world.

However, while flexibility in LNG trade has grown, liquefaction plants and their associated business model remain somewhat inflexible. Liquefaction projects are built to run at nameplate capacity throughout the whole year, providing baseload supply as opposed to supply flexibility. As such, LNG supply and demand have historically been delicately aligned on an annual basis. Although an evolving LNG market has shown an ability to provide trade flexibility in response to wider gas market developments, liquefaction projects provide relatively little upward price-responsive volume flexibility to the global gas market.

Unprecedented impacts on wholesale gas prices

European willingness to pay for incremental LNG volumes edged out more price-sensitive markets as key global gas and LNG price benchmarks rose to unprecedented levels in 2022. This willingness to pay drove European price markers to a premium against Asian benchmarks, sparking a fundamental shift in global LNG trade. With a sizeable share of flexible volumes, the global LNG market was able to respond to the European market imbalance. However, this shift still mutualised the repercussions of the supply shock to markets as far away as Bangladesh, India and Pakistan. In the increasingly globalised market that LNG has become, the reverberations of regional fundamentals are felt globally, notably through spot pricing.

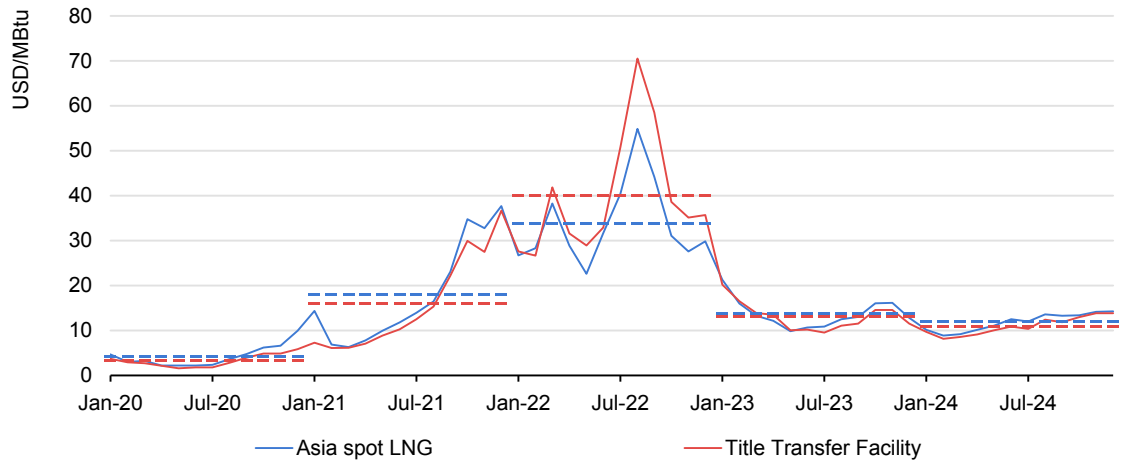
Spot pricing enables market participants to trade gas volumes for short-term delivery, providing a key balancing function at both the individual portfolio and broader market levels. Wholesale spot LNG and gas pricing acted as the market signal for the reconfiguration of global LNG trade flows during the crisis, notably through a shift in relative pricing between regional price benchmarks. This shift in pricing helped balance the market for a commodity in a tight supply situation.

The swift readjustment of global LNG flows illustrated a degree of flexibility and efficiency in responding to a market imbalance. European hub gas prices at the Title Transfer Facility shifted from a 12% discount relative to the Asian spot LNG marker in 2021 to an average premium of 19% in 2022, illustrating Europe's stronger willingness to pay for spot LNG cargoes. Traded LNG volumes followed suit, shifting from Asia to Europe.

However, beyond the relative shift in regional gas price benchmarks, absolute prices reached prohibitively high levels. European month-ahead hub gas prices at the Title Transfer Facility averaged over USD 50/MBtu in summer 2022 – a

fourfold increase on summer 2021 levels. Asian spot LNG prices rose in tandem, also reaching record highs over this period.

Asian and European gas price benchmarks, 2020-2024



While price increases had the function of paring back demand to help balance a tight market situation (see next chapter), their sheer magnitude also had detrimental effects on the security of energy supply, economic activity and governments' fiscal situations.

Not all LNG-importing countries faced the same pricing realities through this supply shock. Although spot prices rose to many multiples of their previous yearly averages, prices for volumes delivered through long-term contracts – often indexed to oil prices – were, by design, much less volatile. As such, countries with different supply mixes and varying degrees of spot market exposure faced different price pressures from their supply portfolios.

Impact analysis of the two largest LNG import regions

Europe

Background

Natural gas is a central element in Europe's energy landscape, accounting for about one-quarter of primary energy supply and playing a role across virtually all demand sectors. In the run-up to the crisis, the European continent could count on a multitude of gas supply sources: domestic production, pipeline imports and LNG imports. This diversity of sources fostered gas-on-gas competition and a growing reliance on spot-traded supply, notably in LNG. From 2015 to 2021, the share of short-term and spot-traded LNG imports grew from 10% to about 40% – a share that kept growing through the crisis years to reach 46% in 2024. This allowed importers and buyers to forgo an element of volume risk in their contracting while taking on an element of price risk in cases of immediate and unforeseen demand requirements.

Equally central to the continent's natural gas landscape is its extensive underground gas storage capacity, totalling about 100 bcm, spread across 19 EU member states and a handful of non-EU markets. Given the highly variable nature of Europe's gas demand, underground gas storage plays a crucial role in balancing both seasonal and immediate fluctuations in demand and supply, acting as an important pillar of the continent's security of supply.

Finally, beyond access to varied supply sources and sizeable underground gas storage capacity, Europe's – and more specifically the European Union's and the wider Energy Community's – gas market is underpinned by an important regulatory framework. The framework provides visibility and predictability to the rules dictating trade in natural gas. Successive regulatory packages have enshrined principles of fair competition and market access, ensuring efficient use of the continent's extensive import and transmission infrastructure. Above all, this regulatory framework acts as a foundation for discussions around the European Union's security of gas and wider energy supply.

Impact on gas demand in Europe

Gas demand reductions in the European market occurred across all gas-consuming sectors, leading to the region's largest year-on-year demand drop on

record. High gas prices were a key factor in driving this demand; relatively mild winter weather and public awareness campaigns targeting a shift in consumer behaviour also contributed to the decline.

Residential and commercial sector

The largest year-on-year decline in European gas demand came from the residential and commercial sector, reflecting the impacts not only of a high-price environment but also of milder weather, notably in the fourth quarter of 2022 and 2023. Warm temper atures persisted through the autumn months across much of the continent, delaying the start to seasonal heating needs. As the winter progressed, gas demand for space heating broadly remained below previous-year levels.

While weather-related factors are estimated to have accounted for up to about 40% of the decline in distribution-level gas demand, fuel switching and behavioural shifts also played a key role in reducing European gas demand, as did a degree of efficiency gains. These effects were more directly linked to the high-price environment.

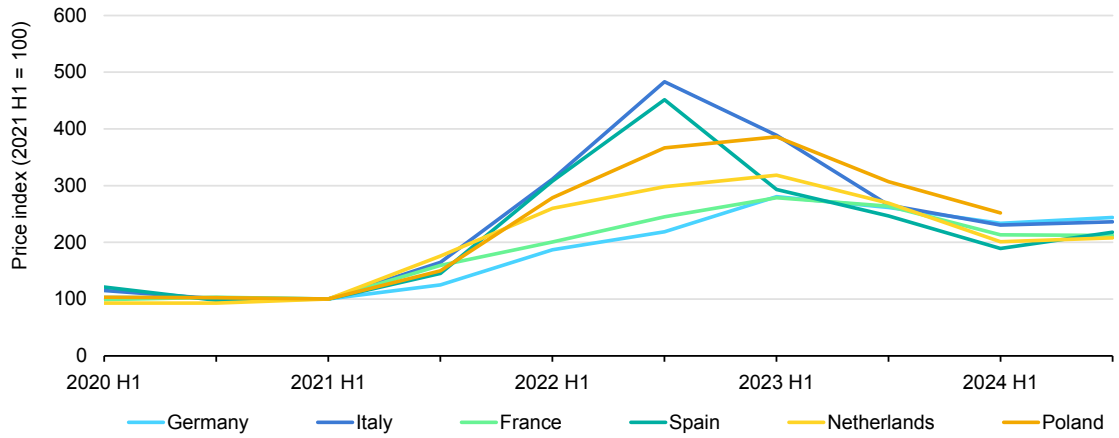
High wholesale prices progressively fed through to retail markets, leading consumers to face increasing gas and electricity bills. Despite significant fiscal support by governments – particularly in EU member states – consumer habits shifted under price pressure. Government-led gas-saving measures and public awareness campaigns are also estimated to have driven a part of this shift in demand patterns, with both residential and commercial consumers heeding the call to reduce their consumption habits.

Overall, the residential and commercial sector accounted for close to half the total decline in European gas demand.

Industrial sector

The industrial sector’s demand for natural gas was among the first to respond to the gas price shock in Europe, falling by about 23% year on year. This was the largest relative decline of all sectors in 2022 and accounted for close to 40% of the total volumetric decline in European gas demand.

Industrial natural gas prices in top EU gas-consuming markets, 2020-2024



Notes: Gas prices for non-household consumers with a consumption from 10 000 GJ to 99 999 GJ; H1 = first half of a given year.
Source: IEA based on data from Eurostat (2025), Data Browser.

All-time high gas prices supported a degree of fuel switching away from gas and towards alternative fuels, notably oil products. However, fuel-switching potential was not evenly spread across all industrial activities and remained a secondary driver in the sector's reduction in gas demand. Several industrial plants across the continent reduced their output or simply shut down, in some cases turning to foreign-produced finished goods or feedstock to replace domestic production. Chemical and fertiliser companies were among the hardest hit, but the production of iron and steel, non-ferrous metals, non-metallic minerals, and wood and paper products was also impacted by cutbacks in activity.

Power sector

Although power generation is the second-largest gas-consuming sector in Europe, it represented a relatively small share of the 2022 demand decline for the continent. Power sector gas consumption fell by around 3% year on year in 2022, not out of line with typical annual volatility for the sector. However, this relatively small market movement was the result of opposing market forces.

High and volatile gas prices drove increased fuel competition between gas and coal. As gas prices rose, coal became increasingly competitive in the power mix, leading to coal-fired power generation growing by about 4% in 2022 (after having already grown by 10% in 2021 amid already rising gas prices and a post-Covid rebound in power demand). This growth contrasted with year-on-year declines in the years preceding the global gas shock.

Two other market drivers supported the trend of declining gas demand in the sector. As high gas prices fed through to electricity prices, overall European

electricity demand declined by about 4% in 2022, reducing the call on gas (and other fuels more generally) to generate electricity. Furthermore, continued wind and solar PV capacity additions led to a 10% increase in non-hydro renewable power output.

However, the availability of alternative sources of power generation worked against this declining trend for power sector gas burn. In France, a number of nuclear reactors were taken offline throughout 2022 due to safety and engineering concerns, leading to unprecedentedly low nuclear capacity availability rates. As a result, nuclear power generation fell by 16% across the continent. Simultaneously, European hydropower conditions weakened in 2022, with droughts affecting hydro reservoir levels – notably in southern Europe – leading to a 14% decline in hydropower output. Together, these effects tightened the European power balance, effectively limiting the potential negative impact on power sector gas consumption.

On the whole, gas demand from the European power sector eased during the crisis but would likely have experienced an even steeper decline had it not been for other tightening factors in the electricity supply mix.

Asia

Background

Asia is composed of markets with highly varied reliance on natural gas. However, overall, the fuel accounts for a little over 10% of the region's primary energy supply. Although Asia is a key gas-producing region, its markets rely on pipeline gas trade, as well as intra-regional and inter-regional LNG supply. Although the share of short-term and spot-traded volumes in Asia's LNG imports has risen in recent years (from about 26% in 2015 to 31% in 2024), it has done so at a slower pace than in Europe and it remains below the equivalent share at the global level.

This greater role of long-term contracts in ensuring LNG supply in Asia is the product of multiple elements. Among these elements is the reliance of markets like Japan, Korea and Chinese Taipei on LNG for the entirety of their gas needs. Additionally, the lack of a regional benchmark gas trading hub and the lack of significant underground gas storage capacity have left the region with few flexibility levers in responding to unforeseen market movements. In such a market environment, long-term contracts have emerged as a key security of supply tool.

For example, while spot LNG volumes were rerouted in a short time span in response to significant shifts in inter-regional price dynamics during the crisis, long-term contract holders in Asia had a greater assurance of delivery within the terms of their contracts. These contracting arrangements provided access to LNG

volumes despite tighter market conditions. Furthermore, the predominance of oil indexation in these long-term contracts reduced the price volatility faced by contract holders. However, an analysis of the impacts of the crisis shows that not all markets in Asia were equally prepared to face the 2022-2023 gas supply shock.

Impact on gas demand in Asia

The main LNG-importing countries in Asia were not uniformly impacted by the sharp rise in spot LNG prices in 2022, leading to different degrees of demand destruction across these markets. Differences in purchasing power, exposure to spot LNG purchasing or long-term contracts, domestic market structure (in gas and power), and the availability of fuel substitutes are all factors that explain the extent of the demand impact in any given market.

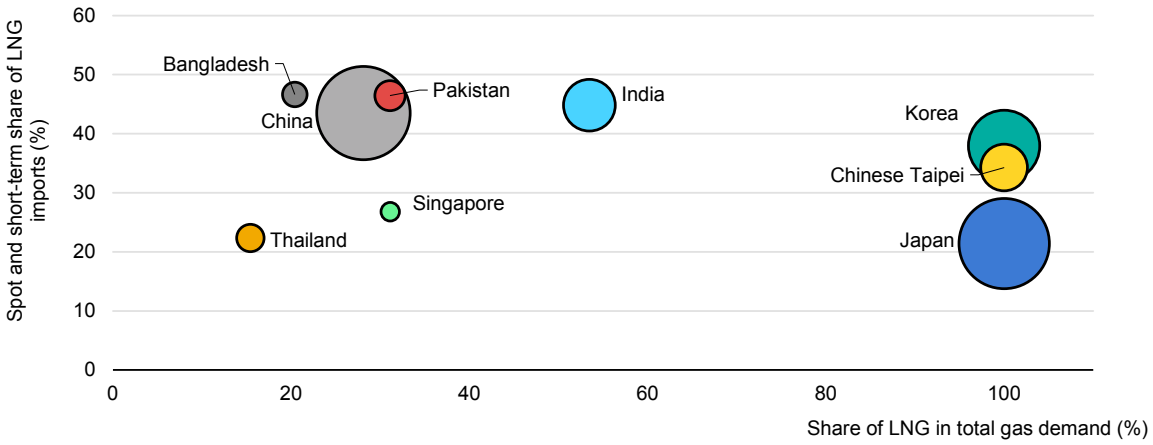
Larger and more mature gas and LNG markets in the region generally had less exposure to spot LNG trade in the run-up to the crisis. Despite being heavily reliant on LNG for their gas requirements, markets like Japan, Korea and Chinese Taipei were better shielded from spot price movements thanks to an important share of oil-indexed long-term LNG supply contracts, largely resistant to spot LNG price fluctuations.[1]

More price-sensitive markets, such as Bangladesh, India and Pakistan, were generally more reliant on short-term or spot LNG supply, leading to exposure to the high-price environment that emerged throughout the crisis. Despite having less reliance on LNG in their gas mix compared with Japan, Korea or Chinese Taipei, these markets faced a marked cutback not only in LNG imports but also in total gas demand.

The financial and fiscal burden of higher spot LNG prices weighed more heavily on these smaller markets. Although high prices acted as the market signal to help balance the global gas market through demand reductions and reorganised LNG flows, they also had a detrimental economic impact on LNG-importing emerging markets, through both supply shortfalls and higher import bills.

[1] Heightened geopolitical uncertainty and tighter fundamentals kept Brent oil prices higher in 2022 than in 2021, leading to a year-on-year increase of approximately 70% in oil-indexed LNG contract prices. However, this price increase remained far inferior to the simultaneous increase in spot price that occurred.

Exposure to LNG and spot LNG, 2019-2021



Source: IEA based on data from GIIGNL (2025).
Note: Average rates shown for the 2019-2021 period. Bubble size represents LNG imports in 2021.

Country-specific impacts on gas demand

In **China**, the 2022 decline in gas demand was partially the result of elevated global gas prices but also partially the result of Covid-related lockdowns. The effects were most visible in the electricity sector, with power sector gas burn decreasing by about 10% year on year in 2022 despite overall power demand growing by about 5% over the same period. Faced with weaker demand and high LNG import prices, gas-fired power plant operators reduced operating hours and, in some cases, outright idled plants.

Total Chinese gas demand fell by close to 1% in these market conditions, but Chinese LNG imports fell by more than 20% (22 bcm). This decline in imports reflected the clear lack of competitiveness of spot LNG volumes compared with domestic and pipeline gas imports, as well as a readiness for certain sectors to alter production schedules or simply switch away from gas towards alternative fuels.

Japan and Korea saw limited demand response to high spot LNG prices in the short term, due notably to lesser price elasticity of demand. Particularly in Japan, relatively low reliance on the spot LNG market also contributed to shielding the country from the worst of the crisis price spikes. Much of Japan's supply mix is made up of long-term contracts with price indexation to oil, ensuring a degree of relative stability in times of important gas market fluctuations. These more stable and lower prices – combined with relatively strong purchasing power– allowed for a much more muted crisis-related impact on final gas demand.

Natural gas use in power generation dropped significantly in **India**, with much of the gap filled by a ramp-up in coal-fired plants. Skyrocketing LNG prices in the

spot market – where Indian buyers are traditionally relatively active and highly responsive to price dynamics – made an already premium fuel even more expensive relative to alternatives. Gas consumption in the refining and chemical sectors also took a heavy hit as operators with flexibility options switched to oil. Overall, total natural gas demand was down by close to 7% in 2022, and LNG imports fell by 17%. The drastic fall in LNG imports reflected a lower level of willingness among Indian buyers to source cargoes beyond their long-term contractual arrangements at a time of record global spot prices.

Pakistan was among the markets hardest hit by the global natural gas supply shock, as high spot LNG prices led both to a forced reduction in gas demand and to a significant fiscal and economic burden on the country. LNG imports fell by about 18% year on year in 2022, and overall gas demand shrank by close to 9% as power generation switched away from gas and towards oil. Despite this fuel switching, the country faced rolling blackouts amid fuel shortages.

Simultaneously, the LNG volumes sourced at high prices from the global market – key for a number of sectors including in fertiliser production and other industrial applications – fed into double-digit inflation, falling foreign exchange reserves and a worsening current account balance. Furthermore, some of Pakistan's term suppliers defaulted on more than a dozen contracted cargoes scheduled for delivery throughout 2022, likely driven by lower contractual penalties than the potential gain of selling volumes on the spot market. This further limited the country's access to lower-priced volumes.

Bangladesh experienced similar widespread power cuts to Pakistan as it significantly curtailed LNG imports at the height of the crisis, leading to the shedding of nearly 20% of the country's power load during peak summer demand.

Overall, emerging and developing markets across Asia illustrate the critical impact of the crisis not only on natural gas demand but also on annex energy markets and on governments' budgetary constraints. While outright fuel shortage remained a relatively minor factor in European gas demand reductions, it played a much more important role in scaling back demand in a number of more vulnerable Asian markets exposed to the spot LNG market.

Policy response to the crisis

As markets reeled from the drastic reduction in Russian pipeline gas supply to Europe and as global trade and demand patterns shifted, governments did not remain idle. Faced with the spectre of supply shortages, worsening current accounts, and inflation pressure linked to energy imports and rising energy prices for citizens and businesses alike, governments across the main LNG-importing regions rapidly implemented policy and market measures in response to the crisis.

Europe

The European Union and its member states adopted a number of measures to enhance security of supply and market resilience ahead of the 2022/23 heating season. However, the European Union's preparation in handling gas market shocks dates back to well before the emergence of the 2022-2023 crisis.

Over more than a decade, the European Union rolled out successive regulatory packages that introduced the fundamental principles of unbundling of energy infrastructure from production and supply activities and of third-party access to importing and transmission infrastructure. Under these rules, cross-border trade in natural gas flourished with the standardisation of capacity bookings and the deepening of liquidity at trading hubs across the continent. Additionally, EU policy and regulation emphasised the importance of adequate infrastructure and its efficient use. These measures supported continued investment in interconnections with financial support and accelerated permitting for key cross-border infrastructure projects through Projects of Common Interest and Projects of Mutual Interest. The measures also introduced bidirectional flow obligations at cross-border pipeline interconnection points between member states.

The European Union's gas market design – the product of a long-term and concerted regulatory effort – acted as the foundation for the continent's resilience in managing the 2022-2023 gas supply shock, providing predictability in market functioning, as well as a structure on which to implement further policy tools. Furthermore, the EU regulation setting up a system of crisis management and information exchange around security of gas supply as early as 2017 meant that dedicated communication channels were largely operational by the start of the 2022-2023 crisis.

Most crisis-driven intervention, regulation and policies reinforced foundational strengths of the EU gas market, protecting ease of market access, barrier-free trading and gas-on-gas competition through diversification of supply sources.

However, while many of these policies at the EU and member state level have contributed to solutions to pressing concerns that emerged throughout the crisis, security of supply remains a key concern for Europe, and there remain opportunities to adjust or enhance some interventions.

REPowerEU

In March 2022, a month after Russia's full-scale invasion of Ukraine, EU leaders agreed in the European Council to phase out Europe's dependency on Russian energy imports as soon as possible. The REPowerEU plan, unveiled in May 2022, provided the overarching framework guiding the European Union's medium-term response to the energy crisis.

A central objective of REPowerEU was to phase out Russian fossil fuel imports – including pipeline gas and LNG imports – well before 2030, which was later specified to mean a 2027 target. To achieve this target, the plan has promoted the diversification of gas supply sources, notably through increased LNG imports and enhanced pipeline deliveries from trusted partners like Algeria, Azerbaijan and Norway. REPowerEU also supported investment in new LNG infrastructure – including floating storage and regasification units – to address immediate regasification bottlenecks, particularly in northwest Europe.

On the demand side, REPowerEU supported the pooling of gas demand and emphasised energy savings and fuel switching, including demand reduction measures and support for alternative fuels like biomethane and renewable hydrogen. It also laid the groundwork for accelerated permitting of renewables to drive efficiency improvements and reductions in energy (including gas) demand.

Following the initial co-ordinated European response to Russia's invasion of Ukraine, the European Commission published in June 2025 its roadmap to completely halt EU imports of oil, gas and nuclear energy from Russia.

Minimum gas storage obligations

The European Union adopted a new storage regulation at end of June 2022, according to which a member state's aggregate storage capacity had to be filled to at least 80% before the winter of 2022/23 and to 90% ahead of all following winter periods.[2] EU member states were free to implement these targets in the manner they saw fit, but the European Union reached its 80% target by September 2022 and has since successfully reached its 90% target ahead of the subsequent winters.

[2] The storage obligation was accompanied by a burden-sharing mechanism to ensure a fairer distribution of responsibility across countries with and without underground gas storage facilities on their territory.

In June 2025, the European Commission and the European Council reached a provisional political agreement to extend the storage regulation while introducing flexibility in reaching the EU-wide gas storage target. Under the amendment – which was later adopted in July 2025 – the 90% fill target before winter remains in place but can be reached at any point from 1 October to 1 December (instead of by 1 November). Furthermore, the amendment introduces greater flexibility in reaching the filling target, particularly in situations of unfavourable market conditions.

Discussions on increased flexibility in reaching the fill target stemmed from market unease around the potential counter-effect of storage obligations on market pricing. The introduction of the initial storage regulation in 2022 and the subsequent rush to fill underground gas storage from below-average levels at the end of winter 2021/22 coincided with the worst of the gas price spike during the crisis.

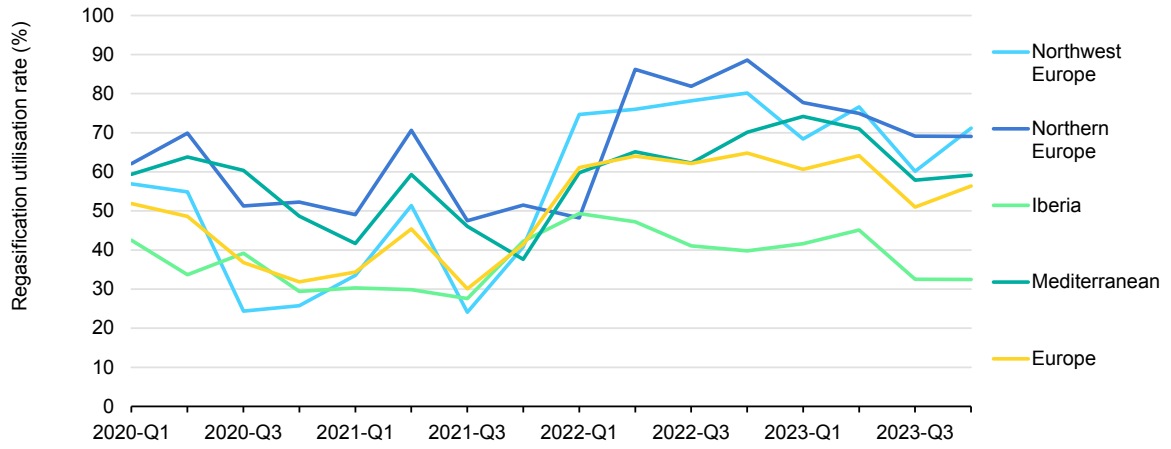
Early 2025 presented another scenario for the market, whereby forward gas prices for summer were as high as forward prices for the following winter. This partially reflected the market's anticipation that EU member states' obligation to reach the 90% fill target by 1 November – particularly given low storage fill in spring 2025 – would require storage capacity holders to buy gas to replenish stocks at any cost.

Although multiple market forces and factors were at play in determining outturn and forward prices in both instances, the European Union acted quickly, aiming to increase flexibility in its storage regulation and reduce the potential for the storage target to lead to unwanted counter-effects in the market.

Additional LNG regasification capacity

LNG played a crucial role in offsetting the shortfall in Russian gas supplies to Europe in 2022 and 2023. With the rise in LNG imports, utilisation rates at European regasification terminals increased markedly, reaching close to 90% of nameplate capacity in northwest European markets in Q4 2022. Prior to the crisis, EU regasification plants had significant spare capacity.

Utilisation rates of European regasification terminals, 2020-2023



Source: IEA based on ALSI (2025), LNG Inventory.

However, the expansion of existing regasification terminals (already planned) and the leasing of floating storage and regasification units (a direct response to the crisis, with many facilities connected at record speed) allowed the European Union to expand its regasification capacity by 15% (or about 25 bcm/yr) during winter 2022/23.[3]

Although these new floating regasification facilities did not guarantee LNG volumes and their overall utilisation rates remained relatively low, much of the value in the new infrastructure was in its redundancy role. Europe had already felt the effects of losing access to its most critical import pipeline infrastructure, and floating storage and regasification units increased options for buyers in cases of unexpected disruptions along the continent's remaining key pipeline supply routes (Norway and North Africa).

Gas-saving measures

In July 2022, the European Union adopted a regulation on co-ordinated natural gas demand reduction measures, targeting a 15% voluntary reduction in demand compared with the 5-year average between 1 August 2022 and 31 March 2023. In an instance of substantial risk of a severe gas supply shortage and/or exceptionally high gas demand, a "Union alert" could be declared by the European Council in response to a proposal by the European Commission. The declaration of a Union alert would transform the voluntary reductions into a mandatory measure.

[3] Over the 2022-2024 period, floating storage and regasification units were added in Estonia (shared with Finland), France, Germany, Greece, Italy and the Netherlands, with additional regasification capacity added in 2025 and further projects planned or under construction.

Once again, EU member states were responsible for implementing the voluntary reduction, and some member states were granted derogations. Ultimately, the voluntary measure was extended by 1 year in 2023, coming to an end on 31 March 2024.

Although the high gas price environment remained the key driver of cutbacks in gas demand across Europe, the EU gas-saving measures provided a framework and target in case of worsening fundamentals. Additionally, the measures provided a reference and co-ordinated backing to the public awareness campaigns that member states set up in an effort to encourage a collective effort in reducing overall energy consumption.

Cross-border solidarity arrangements

The 2022-2023 energy crisis exposed the vulnerability of individual EU member states to supply shocks – particularly in landlocked and historically import-dependent regions – and underlined the criticality of the European internal market. In recognition of the interdependent nature of the internal gas market, the European Union strengthened its legislative framework around cross-border solidarity. The principle was originally established in the European Union's 2017 security of gas supply regulation (2017/1938), obliging member states (where bilateral agreements had been reached) to provide gas to neighbouring countries in the event of a severe supply crisis, prioritising households and essential social services.

During the 2022-2023 crisis, the European Commission bolstered this regulatory framework, encouraging the finalisation of bilateral solidarity agreements between neighbouring member states and introducing standard rules for countries without such bilateral solidarity agreements. Although progress remained slow – only a handful of formal agreements were concluded by mid-2023 – the political commitment to mutual assistance in case of emergency was reinforced. The European Union also introduced measures to enhance transparency and co-ordination, including obligations to notify and consult with neighbouring states on planned emergency interventions. The solidarity framework thus served both as a legal backstop and as a deterrent against uncoordinated national actions that could have exacerbated regional gas shortages.

Market correction mechanism

In late 2022, as European gas prices reached unprecedented highs, the European Union adopted a market correction mechanism intended to curb excessive price spikes at the Title Transfer Facility, the region's most influential gas trading hub. The mechanism was designed as a temporary and exceptional tool, triggered only under strict conditions – specifically, when front-month Title Transfer Facility

prices exceeded a set threshold for several consecutive days and diverged significantly from global LNG reference prices.

Although the market correction mechanism was controversial from the outset, its primary aim was to prevent speculative pricing disconnects that could undermine both consumer confidence and industrial viability. Critics warned that interfering with market price signals could distort trade flows and hinder Europe's ability to attract scarce LNG cargoes in tight global markets. In practice, the market correction mechanism was never triggered, and while its market impact is difficult to demonstrate, its presence may have helped calm market behaviour during winter 2022/23. However, recognising the mechanism's limited utility and the improving market fundamentals, the European Union allowed the mechanism to expire on 31 January 2025 without extension.

AggregateEU

Launched as part of the European Union's longer-term response to the energy crisis, the AggregateEU initiative aimed to pool gas demand from European buyers and co-ordinate joint purchasing on a voluntary basis. The mechanism was designed primarily as an additional tool for diversification of supply under the phase-out of Russian gas. It was aimed particularly at supporting smaller member states and companies with limited market leverage, enabling them to access a broader pool of suppliers and to negotiate more competitively. Inspired in part by the successful Covid-19 vaccine procurement strategy, AggregateEU sought to introduce more coherence and transparency into gas procurement while avoiding internal bidding wars.

Through seven rounds of demand aggregation and matching of supplier bids between 2023 and 2025, the platform matched close to 100 bcm of gas on behalf of 190 participating companies. There is no publicly available evidence that the mechanism led to the signing of substantial new gas contracts or to better prices for participants (notably because of sensitivity of data and confidentiality constraints). However, its role was to provide options and to be primarily facilitative rather than contractual, helping co-ordinate interest rather than centralising procurement, in line with the European Commission's objective not to interfere in contract negotiations.

There is also no evidence that AggregateEU has been successful in attracting new LNG volumes to the European market, where buyers have continued to transact through existing bilateral channels. Nevertheless, the initiative did not interfere with market functioning and laid the groundwork for further demand co-ordination in the future.[4]

[4] The EU Energy and Raw Minerals Platform, launched in July 2025, aims to extend demand co-ordination mechanisms, notably to alternative gases such as biomethane, hydrogen and hydrogen derivatives.

Measures to shield consumers from high prices at the national level

As wholesale gas prices surged in 2022 and early 2023, European governments introduced a wide array of national-level measures aimed at cushioning the blow for households and businesses. These responses included both direct subsidies and broader price containment mechanisms, reflecting the urgent political and social need to protect consumers from unaffordable energy costs.

The bulk of these interventions took the form of regulated retail tariffs, VAT reductions, lump-sum payments and compensation schemes for energy suppliers. Several countries introduced price caps or froze retail gas tariffs, while others opted for targeted income support to vulnerable households. Some governments provided financial incentives to switch from gas to alternative heating sources or invested in building renovations and insulation measures to reduce end-use gas demand. For industry (and businesses in general), temporary support packages were made available to preserve production viability and safeguard employment in energy-intensive sectors, though such measures varied widely across member states.

While these policies helped avoid widespread fuel poverty and social unrest, they also had fiscal and economic downsides. The total cost of energy support measures across the European Union was significant. The European Commission estimated the total cost of energy subsidies at EUR 390 billion in 2022 alone. Another source put the total at EUR 540 billion for the period between September 2021 and June 2023. Much of this state support was not targeted strictly at the most vulnerable consumers, instead being provided to all consumers, irrespective of their ability to bear certain costs. Moreover, artificially low retail prices in some cases weakened the pass-through of market signals to end users, potentially diluting efforts to incentivise energy efficiency and reduce demand.

Despite this, industrial gas consumption across the European Union fell markedly – by more than 20% in some countries – driven primarily by high prices and weaker economic activity rather than by government-imposed rationing. While some of this demand destruction proved temporary, structural changes remain evident in energy-intensive industries such as fertilisers, chemicals and glass production. In this sense, government interventions succeeded in avoiding the most acute socio-economic impacts of the crisis, highlighting that balancing supply and demand purely through market price signals during crisis periods is not politically acceptable. Nevertheless, these measures could not fully insulate European industry from the consequences of sustained high gas prices.

Asia: Demand market reactions

In Asia, government intervention as a result of the gas supply shock was a combination of capitalising on market strengths – namely, LNG buyers' favourable legacy positioning in mature gas markets like Japan and Korea – and putting forward last-ditch emergency response measures, mostly in smaller, more vulnerable gas markets.

The variety in size, maturity and structure of gas markets across Asia meant that countries had very different levels of preparation for the gas supply shock. Furthermore, varied economic and fiscal conditions across these countries constrained certain governments in the policy tools they could feasibly implement.

Japan

Japan entered the 2022-2023 energy crisis with considerable contractual coverage and a diversified, resilient procurement portfolio, allowing it to navigate a tight global LNG market more smoothly than many emerging importers. Japan's long-standing strategy of ample long-term contracting of LNG provided a natural buffer against spot market volatility, but the government introduced several measures to further bolster energy security and shield consumers from rising costs.

Japan's Strategic Buffer LNG scheme, introduced under the Economic Security Act in 2023, aims to strengthen emergency LNG preparedness. Under the scheme, JERA, the designated operator, must procure at least one additional LNG cargo per month during the winter (December to February), with delivery guaranteed within 18 days in emergencies. The recipient is decided through co-ordination between public and private stakeholders. To offset financial risk, the Japan Organization for Metals and Energy Security manages a public fund to cover potential resale losses if the cargo goes unused. While not yet triggered, the scheme addresses the procurement delays and market co-ordination challenges exposed during earlier crises.

To mitigate the impact of high energy prices on end users, the government also provided subsidies to utilities, enabling them to offer discounted electricity and gas tariffs to households and businesses. In parallel, Japan advanced longer-term measures, including announcements reiterating its ambition to restart idle nuclear reactors (although this process stems from long-term planning more than crisis response measures). Other efforts included intensified regular monitoring of LNG inventories by the Ministry of Economy, Trade and Industry and the establishment of national and regional co-ordination schemes among LNG buyers. While some of these initiatives had limited short-term impact, they formed part of a broader strategy to reduce reliance on spot LNG volumes and enhance resilience against future supply shocks.

Japan also actively expanded its international co-operation networks in response to the crisis, signing several memoranda of co-operation in the field of LNG (particularly in the region but also beyond), including with Singapore and Thailand, as early as 2022. Japan's JERA and Korea's KOGAS, the countries' largest LNG buyers, also signed a memorandum of understanding in April 2023 on co-operation in the LNG market. The agreement outlined opportunities for collaboration at an operational and strategic level, recognising the potential for leveraging the scale and impact of large market actors in co-ordinating responses to market shocks.

Korea

Korea adopted a pragmatic mix of market and administrative measures to manage the gas supply and price crisis in 2022. On the demand side, the government enacted short-term fuel-switching measures, including suspending seasonal coal power generation limits during the peak summer months to reduce LNG burn in the power sector. It also moved forward the commissioning of new coal and nuclear capacity to ease pressure on LNG-fired generation. Korea's authorities allowed significant increases in regulated electricity and gas tariffs – tariffs rose multiple times in 2022 and early 2023 – to reflect the steep rise in import costs and to temper demand growth. While politically sensitive, these increases were key to transmitting price signals to consumers and curbing consumption. Korea also undertook voluntary demand restraint in certain industrial segments and advanced the use of demand-side management tools. Although no structural shifts in energy mix occurred in the immediate term, Korea's response demonstrated the importance of flexibility in dispatch, realistic pricing policies and a diversified fuel portfolio in managing crisis-induced shocks.

Pakistan

Pakistan was among the hardest hit LNG importers during the 2022-2023 energy crisis, facing an acute inability to secure spot cargoes as prices surged beyond affordability. The country's LNG contracts provided only partial coverage, a situation worsened by cancellations of contracted cargoes by the country's LNG suppliers. Repeated attempts to procure additional volumes through tenders failed due to uncompetitive bids or a lack of interest from sellers. As a result, the government implemented drastic energy conservation measures to manage limited fuel availability.

In June 2022, Pakistan introduced electricity demand curbs, such as limiting commercial operating hours, imposing early closures on shops and factories, and shifting to a five-day (from six-day) work week for public sector employees. Industrial output in energy-intensive sectors declined significantly, and rolling blackouts became more frequent.

The crisis exposed the vulnerabilities of overreliance on imported LNG without sufficient contractual cover, as well as the risks associated with relatively lenient penalties for cargo cancellations in term contracts in exchange for more favourable pricing. The country's experience underscored the outsized impact of LNG price volatility on emerging markets with constrained fiscal and procurement capacities. In response to this, however, Pakistan showed renewed interest in domestic resource development and the role of renewable power generation, which accelerated greatly since 2022 as a result of record solar PV capacity installations (notably off-grid).

Conclusion and lessons learned

Market environment is structurally and geopolitically more fragile

One of the primary and most fundamental consequences of the energy crisis is the shift into a structurally more fragile natural gas market environment, compounded by geopolitical uncertainty. The drastic reduction in Russian pipeline flows to Europe also represented a loss of traded gas volumes in the global market. Concurrently, this drove an equally significant reduction in the availability of swing production capacity that had previously provided a degree of price-responsive supply modulation to both the European and global markets. In turn, this led to an increased reliance on LNG trade flexibility to respond to the global market imbalance.

However, while LNG proved capable of providing extra supply to Europe, this was ultimately a zero-sum solution at the global market level, necessitating a loss of LNG supply in other markets. While LNG trade remains highly price-responsive, it offers little upside production response to prices. Simply put, the LNG market – on its own – is ill suited to replacing the global gas swing production capacity lost during the crisis. With fewer supply-side response options available, the global gas market finds itself with fewer tools to recover quickly from sudden or unexpected shifts in fundamentals.

At the heart of the crisis, governments implemented measures that were key in supporting alternative or existing supply-side flexibility tools, including minimum storage obligations in the European Union and the Strategic Buffer LNG scheme in Japan. Flexibility levers such as these, while not intended to replace lost forms of swing production, aim to improve market resilience in case of supply shocks. Further developing such options and mechanism will be key in safeguarding flexibility in the global gas and LNG market and navigating tight market periods.

Supply security in Asia and Europe is intimately connected

Asia and Europe are the two largest poles of LNG imports in today's market, creating a situation of potentially concurrent needs, particularly in times of tight market conditions. The balancing of the global gas market during the crisis and the diversion of LNG flows from Asia to Europe is an example of this fundamental link and of the potentially zero-sum nature of competition for access to LNG between these two regions. In a market with fewer swing production options

available and with an increased reliance on LNG to respond to supply imbalances, this reality is susceptible to re-emerging.

While competition may be inevitable in a market system, concurrent necessities and constraints across the global LNG market's primary poles need not lead to panic buying and bidding wars in crisis periods. Strengthening dialogue, co-operation and co-ordination among like-minded importers and responsible suppliers – notably by developing gas reserve mechanisms – is essential in reducing uncertainty and enhancing predictability around the balancing of the global gas market in response to crises. Crucially, for these developments to deliver their full benefits, they must take place ahead of potential future supply shocks.

Redundancy: Infrastructure needs are likely to be greater in a less certain energy landscape

In a structurally more fragile and uncertain energy landscape, ensuring supply security is likely to require building out and maintaining a larger energy infrastructure stock than would be optimal in a more stable geopolitical and market environment. Infrastructure remains the backbone of liquid and flexible energy markets, and its redundancy contributes to supply security, particularly in a structurally more fragile energy landscape.

Along the entire gas value chain, targeted redundant infrastructure acts as an insurance policy against market shocks, as seen by the European Union's rapid installation of floating storage and regasification units in response to the loss of a key supply source. While the European Union's newly installed floating storage and regasification units remained broadly underused throughout the crisis, their installation meant that Europe was in a better position to weather further supply shocks that could have impacted legacy supply routes. Going forward, careful analysis of the benefits and costs of mobilising investments in gas and wider energy infrastructure – or of extending certain legacy infrastructure lifespans – within countries' long-term energy planning will be essential in unlocking the potential redundancy value of infrastructure in strengthening global gas security.

Supply portfolios impact how countries weather supply shocks

A country's overall energy mix and industrial base, its purchasing power and the fiscal robustness of its government all contribute to its ability to weather the impacts of gas or wider energy market shocks. Another major element is the composition of buyers' gas and LNG supply portfolios. As illustrated in the 2022-2023 crisis, varying levels of long-term and short-term contractual supply coverage meant that countries felt the impacts of the supply shock with varying degrees of severity.

LNG supply portfolios skewed towards short-term or long-term contracts provide different advantages and drawbacks. The former (skewed towards short term) provide a hedging opportunity against future demand uncertainty; the latter (skewed towards long term) offer stronger assurance of stability of supply even in episodes of tight market conditions. Price formulae in these contracts – whether linked to market prices and indices or to alternative fuels like oil – add another layer of customisation in managing objectives and risks in a supply portfolio.

A relevant example is Japan: Its access to LNG during the crisis was largely unaffected, and average import prices remained well below prevailing spot indices thanks to a large share of long-term contracts indexed to oil prices. A predominance of short-term and spot-sourced volumes in Europe, however, meant that attracting LNG volumes that were not secured through long-term commitments came at a significant cost to buyers and (through support measures) to national current account balances. A third category of LNG importers, notably some smaller gas markets in Asia, did not have the purchasing power to retain short-term and spot-sourced volumes, which they previously had access to in more balanced market conditions. These markets suffered the double sanction of having less stable LNG supply and having to pay more for the reduced volumes that they were able to access on a spot basis beyond their long-term contracts.

Taking a strategic approach to building supply portfolios, including the use of term contracts, can mitigate price and supply risks during emergencies. The contractual and pricing terms of buyers' LNG supply portfolios should reflect the intentions of supply strategies and should be in line with the risks that market players are willing and able to take with respect to volatility in both volume and price of supply. Expectations of future demand and varying degrees of appetite for risk will mean that contracting strategies will vary across entities and over time, but conscious decisions with respect to contracting – regardless of the entity – remain a determining factor in managing supply shocks and market movements.

Energy affordability is akin to energy security

The 2022-2023 crisis underlined that energy security itself is not just about access to volumes – it is also about affordability. It matters little if gas supply is cut off because of the lack of physical supply or because it has become effectively unaffordable. In the end, the economic and social result is much the same.

Governments across Asia, Europe and the rest of the world implemented various measures and support mechanisms directly addressing the pressures of high energy prices on their citizens and economies. However, balancing the dual issue of affordability and security in the future – addressing each without undermining the other – will also require bolstering demand-side flexibility tools. Support for affordability should work in tandem with demand response as a targeted flexibility

tool, intervening well in advance of detrimental demand destruction as a balancing factor of last resort.

Addressing these dual issues beyond the national sphere could require creating or enhancing solidarity frameworks at an intra- and inter-regional level. Part of this co-ordination should include increased transparency and the sharing of best practices around the implementation of affordability and demand response measures to enhance the market's collective capacity to tackle future supply shocks.

Next steps

This report aims to provide a common basis of understanding of the 2022-2023 energy crisis on which to build further analysis of the tools that could be developed and implemented to mitigate the effects of potential future gas supply shocks. The IEA is undertaking specific analysis of these potential tools and mechanisms through its 2-year work programme with Japan's Ministry of Economy, Trade and Industry and remains committed to advancing gas supply security through its Natural Gas and Sustainable Gases Security Working Party and its regular work and analysis.

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