



The impact of energy shocks on financial stability in the context of the 2022 episode

Energy companies (producers, suppliers) are subject to physical and financial constraints, whose associated risks can be partly mitigated through derivatives markets. Financial agents, including banks, play a major role in financing these activities and are therefore directly or indirectly exposed to energy shocks. This article describes the mechanisms at work by examining the impact of the shock of the war in Ukraine on financial stability, which central banks are charged with safeguarding. The analysis also highlights the role of clearing houses in transmitting this shock.

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+561%

variation in the European gas price index between the 2021 average and the August 2022 peak

+63 percentage points

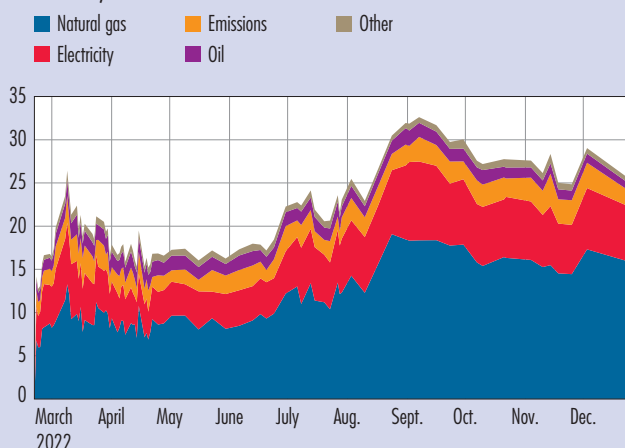
the average increase in the annualised volatility of European gas prices between 2021 and 2022

+181%

the increase in initial margin requirements on natural gas derivatives markets between the start of 2022 and the peak in August 2022

Changes in the initial margins paid by energy producers on securities portfolios held by or with a French counterparty

(EUR billions)



Sources: Depository Trust & Clearing Corporation (DTCC), EMIR data; Banque de France calculations.

Notes: First data 21 February 2022, last data 30 December 2022.

In the title, "by or with a French counterparty" means that either the energy producer is French or the other counterparty in the transaction is French.



1 Organisation of gas and electricity futures markets in Europe

Russia's invasion of Ukraine led to a sharp rise in gas and electricity prices, and increased their volatility.

The first disruptions to Russian gas deliveries to Europe at the end of 2021, followed by the invasion of Ukraine in February 2022 (which led to a sharp reduction in gas exports from Russia from May/June onwards) put significant pressure on wholesale prices and on the volatility of natural gas in Europe (see Chart 1a). Due to the organisation of the European electricity market, the inflationary shock on natural gas also spread to electricity prices, and affected their volatility in the same way (see Chart 1b, and further details on the transmission mechanisms of these shocks in the article by Baget et al., 2023). However, after peaking in summer 2022, gas and electricity prices fell sharply.

Electricity/natural gas derivatives markets are intended to transfer risks

For energy market players, derivatives markets enable them to hedge against the risk of future price variations over the production cycle. Their use of financial derivatives (futures, forwards, swaps and options) varies according to their economic activity. Commercial banks act mainly as intermediaries, allowing non-financial players and investment funds to participate in the market. Non-financial players, such as energy producers, processors and distributors, generally use derivatives to hedge against the price variations that could affect their business. Energy producers protect themselves against a potential fall in prices throughout the energy transport and processing phases, while consumers protect themselves against a future rise in prices before delivery. Lastly, some investment funds participate in the commodity derivatives market by taking speculative directional positions (i.e. in terms of the expected direction in which the price of the underlying asset will change).

C1 Price and volatility of natural gas and electricity

a) Gas

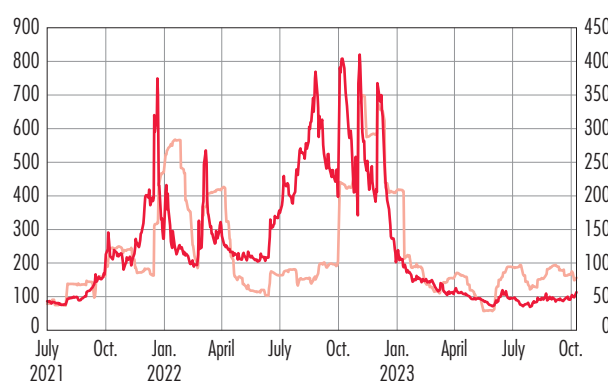
(price in EUR/MWh; volatility as a %)

— Price (left-hand scale)
— Volatility (right-hand scale)



b) Electricity

— Price (left-hand scale)
— Volatility (right-hand scale)



Sources: IntercontinentalExchange (ICE), European Energy Exchange (EEX), Refinitiv; Banque de France calculations.

Notes: Most recent value as at 9 October 2023.

The price of natural gas is derived from front month contracts (i.e. for month M+1) for the Title Transfer Facility (TTF) in the Netherlands (Dutch price index). The electricity price is derived from the short-term baseload contract (corresponding to the delivery of constant power 24/7) on the French market.

Volatilities are annualised and calculated over a rolling 30-day period.



Central counterparties (CCPs) provide secure trading in the derivatives market by acting as intermediaries between buyers and sellers on cleared markets as well as for certain over-the-counter transactions. This central role is designed to limit the risk of loss in the event of a counterparty default, through margin exchanges.¹ These exchanges take the form of initial margins and variation margins. The initial margins of CCPs cover the maximum potential loss in the event of default by one of the counterparties over a period of at least two business days (against five for derivatives traded on over-the-counter – OTC – markets).² Variation margins cover the potential loss on a daily position and are deposited with the CCPs on a daily basis, or even on an intraday basis in the event of high price volatility.

Market participants rarely trade directly with CCPs, but rather through their members. These “clearing members”, often commercial banks, act as intermediaries for their clients, collecting and depositing margins with the CCP. These interactions may act as contagion channels in the event of liquidity pressures.

2 The Russian war in Ukraine poses risks to financial stability

The mechanisms used for setting initial margins create liquidity risks

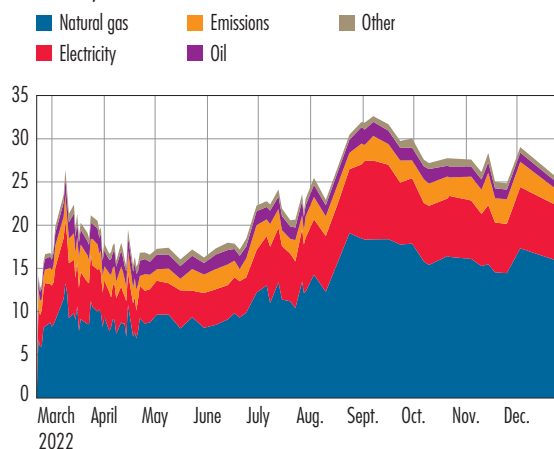
The sharp rise in energy prices caused by the conflict in Ukraine led to liquidity pressures on derivatives markets in 2022.

The high energy price volatility led to an increase in the initial margins charged by CCPs to market participants (see Chart 2). On the natural gas market, the initial margins required on the cleared markets reached almost 80% of the notional value of the contract at the beginning

of April 2022. Although margin calls reduce counterparty risk, they also entail a liquidity risk and constitute a contagion channel between market participants. If margin calls rise sharply, small market players, because of their size, may find it difficult to meet them, and therefore to obtain bank loans or issue debt on the markets. Lastly, the methods used to calculate initial margins can have a pro-cyclical impact: high price volatility leads to an increase in initial margins, which can cause financing difficulties for small market players, forcing them to unwind their positions, which further increases price volatility. Although the commodities segment accounts for only around 1% of the gross notional value³ of positions in the

C2 Changes in the initial margins paid by energy producers on securities portfolios held by or with a French counterparty

(EUR billions)



Sources: Depository Trust & Clearing Corporation (DTCC), EMIR data; Banque de France calculations.

Notes: First data 21 February 2022, last data 30 December 2022. In the title, “by or with a French counterparty” means that either the energy producer is French or the other counterparty in the transaction is French.

¹ Margins, i.e. the amount that a trader needs to deposit as collateral to open a position, are not generally traded directly between end-customers and the CCP. These trades take place i) between CCPs and clearing members (usually commercial banks, which collect and deposit margins on behalf of customers) and ii) between clearing members and their customers.

² See European Commission, delegated regulation 153/2013, Article 26.

³ The notional value corresponds to the gross nominal value of the position entered into and not yet settled on the reference date, while the market value is the price at which this position can be bought or sold on the market.



euro area derivatives market (ESMA, 2021), it accounted for around 20% of the margins exchanged (on average between October 2021 and October 2022) due to the high volatility of the underlying assets (ECB, 2022).

These difficulties in financing margins can lead to bankruptcies and even chains of defaults for companies that depend on the financial health of energy suppliers. This risk materialised when prices rose sharply in the first half of 2022, prompting some governments to intervene to provide liquidity to energy producers in order to avoid bankruptcies. In particular, Finland and Sweden announced in September 2022 that they would provide liquidity guarantees of EUR 10 billion and EUR 23 billion respectively to their national electricity suppliers (Les Echos, 2022). In addition, clearing members can still increase margin calls and, in some cases, demand additional margins from their clients depending on their risk profile. This practice, known as “overmargining”, reduces the counterparty risk borne by banks, but increases the liquidity needs of other market participants.

Banks are generally the largest clearing members of CCPs, and are therefore exposed to the risk of a market participant defaulting on a margin call. In such a case, it is the clearing members who have to pay the margins required by the CCP, which can cause them liquidity problems. The banks therefore decided to extend substantial credit lines to players in the energy sector in 2022, to enable them to meet margin calls and avoid insolvency. In March 2022, European banks had granted around EUR 320 billion in credit lines to energy companies (Les Echos, 2022).

High levels of stress on the energy markets may therefore pose a risk to financial stability, due to banks’ exposure to the liabilities of energy players on derivatives markets and, at the same time, the exposure of CCPs in the event of difficulties on the part of a clearing member.

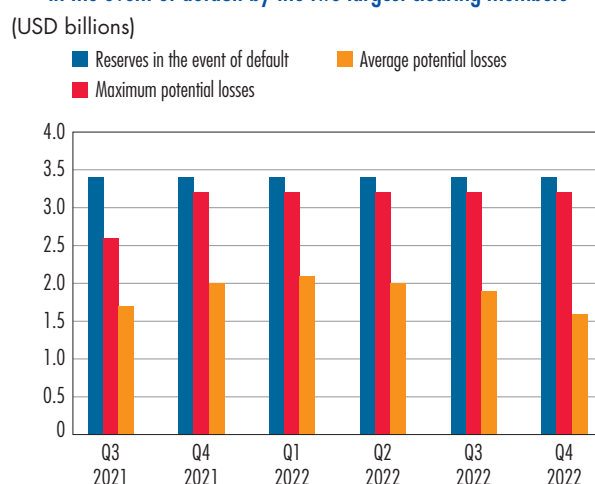
CCPs must manage counterparty risks

CCPs are highly exposed to counterparty risk when a clearing member is unable to meet a margin call. The

stability of a CCP is directly dependent on the soundness of its clearing members and indirectly on the soundness of its market participants. The default of a participant may result in the default of a clearing member, and therefore a counterparty risk for the CCPs. In order to guarantee the financial equilibrium of CCPs, clearing members must be able to absorb margin call shocks and therefore net trades during periods of high market volatility. However, CCPs have mechanisms in place to guarantee their robustness, even in the event of default by their members.

CCPs therefore hold reserve funds, known as “default funds”, intended to cover potential losses in the event of default by one or more clearing members. European Commodity Clearing (ECC), which specialises in energy and commodities, revised upwards the average potential losses resulting from high price volatility between the third quarter of 2021 and the first quarter of 2022 (see Chart 3). In the event of a default by a clearing member, and if the

Chart 3 Reserves of the central counterparty (European Commodity Clearing) in the event of default by the two largest clearing members

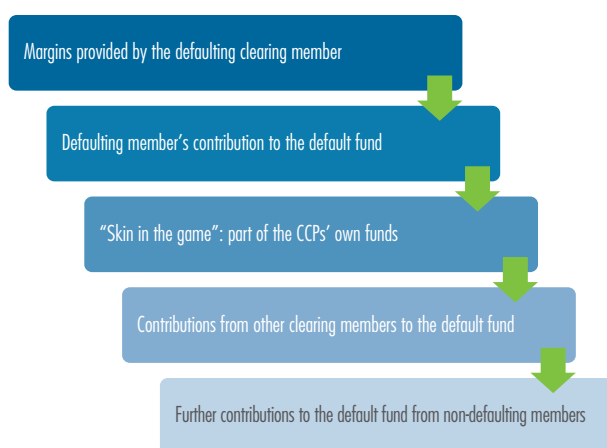


Sources: IntercontinentalExchange (ICE), European Energy Exchange (EEX), Refinitiv; Banque de France calculations.



total losses exceed the default fund, CCPs must use part of their own funds before non-defaulting members contribute to making up the losses incurred (see diagram) — Banque de France, 2022a.

Tiered allocation of losses for CCPs in the event of default by a clearing member



Source: Banque de France (*Payments and market infrastructures in the digital era*, May 2022).

Note: This diagram shows the order in which losses are allocated to players in the event of a member default. The term "skin in the game" refers to the incentive for good risk management by the CCPs.

Liquidity risk for market participants and counterparty risk for CCPs may become systemic due to the essential role played by centralised trading. The high price volatility in 2022 highlighted these risks on the energy market, and the European Commission decided in October 2022 to adopt measures to prevent future liquidity pressures. The first measure raised the clearing threshold for commodity derivatives from EUR 3 billion to EUR 4 billion, to allow companies to carry out more OTC transactions without being subject to CCP margin requirements.⁴ The second measure extended the list of assets eligible as collateral for market transactions to public guarantees and uncollateralised bank guarantees, for a temporary period of 12 months and subject to certain conditions.⁵

Under the aegis of the Basel Committee on Banking Supervision (BCBS) and the International Organization of Securities Commissions (IOSCO), analyses were carried out on margin call dynamics during the energy shock (BIS and IOSCO, 2023). This work was part of a wider review of margin practices (BIS and IOSCO, 2022) and supports the proposed avenues for reflection for improving the resilience of the financial system to shocks. Among these avenues are greater transparency in the

BOX

The indirect impact of the shock to gas prices in 2022 on the stability of the financial system

In addition to its direct impact on the organisation of natural gas markets, the shock to gas prices also had significant indirect impact on financial stability by contributing, along with the rise in oil prices, to an increase in inflation in 2022. The shock to gas prices indirectly exacerbated the vulnerabilities of the financial system through three main channels (see diagram below).

Among the main indirect effects, the rise in interest rates – due to the tightening of monetary policies to curb excessively high inflation – may have contributed to market volatility, prompting investors to make sudden portfolio reallocations. As a result, disruptions to market conditions could have led to wider liquidity management constraints, particularly for non-bank players who do not have the same access to liquidity as commercial banks.

.../...

⁴ European Commission (2022), *Delegated Regulation (EU) 2022/2310 amending the technical regulatory standards laid down in Delegated Regulation (EU) No. 149/2013 as regards the clearing threshold value for positions held in OTC commodity derivative contracts and other OTC derivative contracts*, 18 October.

⁵ European Commission (2022), *Delegated Regulation (EU) 2022/2311 amending the technical regulatory standards laid down in Delegated Regulation (EU) No. 153/2013 as regards temporary emergency measures on collateral requirements*, 21 October.

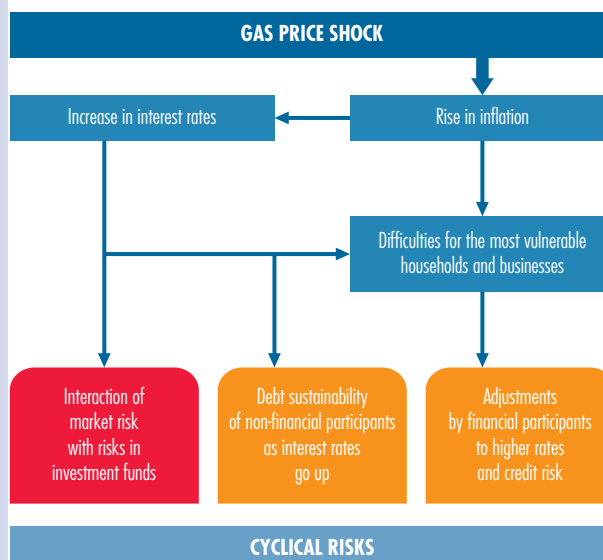


This double shock of rising gas prices and interest rates highlights the problems of debt sustainability for non-financial players: households, non-financial corporations (NFCs) and general government. In France, they mainly borrow at fixed interest rates, which limits short-term risks. However, if interest rates were to remain high, they would have to finance or refinance their debt at a greater cost.

This could pose a problem for some borrowers given the historically high levels of debt in these sectors. The shock to gas prices therefore indirectly increases the vulnerability of the financial system to a potential decline in the creditworthiness of players in the real economy.

Lastly, the indirect transmission of the gas price shock to the financial system also means that the financial sector itself has to adapt to an environment of higher interest rates and possible repayment difficulties on the part of non-financial corporations.

Simplified diagram of the indirect impact of the shock to gas prices in 2022 on the stability of the financial system



Source: Banque de France (*Assessment of Risks to the French Financial System*, December 2022).

margin calculation models used by CCPs, greater efficiency in the collection and transfer of variation margins, a review of the range of types of eligible collateral, and stress test models that give greater weight to very adverse scenarios.

3 Faced with excessively high energy prices, the European Union adopted a mechanism to correct gas prices

The European public authorities responded in a variety of ways to the different risks outlined in the previous section, including support programmes for energy companies. Other mechanisms were also put in place, in the form of explicit price caps on energy commodity prices. In December 2022, the EU established a Market Correction Mechanism (MCM) to limit excessive price variations for natural gas. However, it also entails risks for financial stability.

The price cap mechanism is subject to conditions

Discussions on a price ceiling for the Title Transfer Facility (TTF, the Dutch benchmark for natural gas in Europe) were particularly heated following the record price spike in August-September 2022. Faced with dwindling supplies of Russian gas, European countries sought to replenish their stocks over the summer, leading to unprecedented rises in wholesale natural gas prices: the TTF reached EUR 311 per MWh at the end of August, compared with an average of EUR 47 per MWh over 2021.

However, the price spike on the TTF also stemmed from localised problems. In the summer of 2022, bottlenecks affected liquefied natural gas (LNG) import terminals in the North Sea, so the price increase for TTF was partly due to a demand for "gaseous" natural gas in North-West Europe that was not fully met by LNG deliveries. Conversely, the other regional gas indices, such as the French PEG (*Point d'échange*

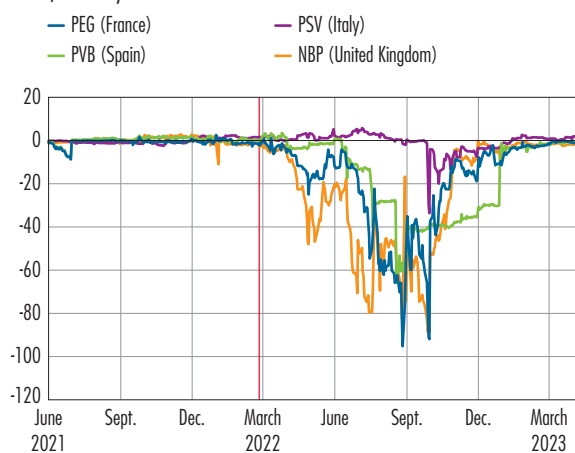


gaz, Gas Trading Point) and the Spanish PVB (*Punto Virtual de Balance*, Virtual Trading Point), although trending sharply upwards over 2022, were trading at a discount to the TTF. France and Spain did not suffer from the same blockages at their LNG regasification terminals (see Chart 4).⁶

The characteristics of the MCM therefore reflect the specific conditions that led to the price peak of summer 2022. The MCM is only activated if the TTF price exceeds EUR 180 per MWh, and especially if the difference between the TTF and LNG prices exceeds EUR 35 per MWh. In other words, the MCM is primarily intended to limit natural gas price rises on this market only in very specific contexts of decorrelation between the TTF and other gas indices, in particular LNG price indices. Once triggered, the MCM sets a cap above which transactions in TTF derivatives cannot be executed. While it is unlikely that the MCM will be activated in the short term (given the sharp fall in the TTF since the crisis – see Chart 1a), it does raise a number of questions for financial stability.

C4 Spread between European and UK natural gas price indices compared with the Dutch TTF index

(in EUR/MWh)



Sources: European Energy Exchange (EEX), Endex, IntercontinentalExchange (ICE) Europe – Bloomberg indices; Banque de France calculations.

Notes: Most recent value as at 6 April 2023.

The red vertical bar represents the date of Russia's invasion of Ukraine (24 February 2022).

Indices: TTF, Title Transfer Facility; PEG, *Point d'échange gaz* (Gas Trading Point); PVB, *Punto Virtual de Balance* (Virtual Balance Point); PSV, *Punto di Scambio Virtuale* (Virtual Trading Point); NBP, National Balancing Point.

The NBP index has previously been converted into EUR/MWh. Prices are derived from front-month futures contracts.

The scope of the mechanism will depend on market developments and the behaviour of players

Since the introduction of the MCM on 15 February 2023, there have been no changes in market structure directly attributable to the new legislation. The market's lack of reaction is mainly due to the fall in prices since the end of 2022, which are now well below the MCM trigger level. Although its short-term impact is negligible, its activation in the event of a further price rise could have an impact on the liquidity of the energy derivatives markets. The degree of impact will depend on changes in market structure, price levels and volatility, and the reaction of market participants (CCPs, clearing members and energy companies).

During the winter of 2022-23, the market benefited from a combination of three favourable factors that may not recur in the winter of 2023-24: relatively mild temperatures, low Chinese demand promoting European access to LNG, high storage levels and substantial deliveries of Russian gas in the first part of 2022. Stocks at the end of winter 2023 (on 1 April) stood at 56%, the highest level ever, but the rise in Chinese gas imports could hamper the ability of European countries to import LNG on a massive scale at competitive costs. Lastly, temperatures may not be as favourable as last winter.

If prices rise again and the MCM is activated, the risk management framework of CCPs could be weakened. In the absence of an accessible centralised market, a fragmentation of trading across several centralised and OTC markets (some subject to the MCM and others not) could be detrimental to the price formation process. Without uniform, observable prices, CCPs may no longer be able to reflect the market value of contracts when calculating margins and managing the default of a clearing member. Such a situation could call into question the proper assessment by the CCP of its exposures and its ability to manage risks. Some of the natural gas trading shifted to the OTC markets before the MCM was introduced, as the margins became too high for some producers at the peak of the energy crisis in August 2022.

⁶ It should be noted, however, that the fragmentation of the physical market described above is at odds with the financial integration of the European gas market. To give one example, even though the Spanish PVB index posted a smaller rise in summer 2022 than the TTF, the fluctuations in the Dutch index still affected Spanish households and businesses. Most long-term natural gas delivery contracts in Europe are indexed to the TTF.



(see Chart 5; note that the share of contracts traded on the OTC market remains a minority over the period).

A price increase triggering the activation of the MCM would lead to an increase in margin calls, which would be passed on to clearing members and ultimately to their customers. In such a situation, clearing members and their customers could be exposed to increased liquidity pressures in an already tight market. Non-financial counterparties make extensive use of gas derivatives as hedging instruments; the activation of the mechanism could therefore limit their ability to manage their risks effectively. They could therefore decide not to hold positions on a contract for which the mechanism could be activated, which would reduce the liquidity of the TTF derivatives market and hedging activities.

The new legislation has sparked reactions from market players, which may lead to the mechanism being circumvented. Europe's two main natural gas derivatives exchanges, the Intercontinental Exchange (ICE) and the European Energy Exchange (EEX), have already announced that they have taken steps to ensure that their customers can continue to trade TTF gas outside the scope of the mechanism. ICE launched a parallel market in London, which was not subject to the mechanism, while the EEX invited market participants to use its Organised Trading Facility (OTF), which was also outside the scope of the mechanism. Shifting trading to alternative platforms is likely to limit the impact of the legislation and the mechanism's ability to contain prices during periods of extreme volatility.

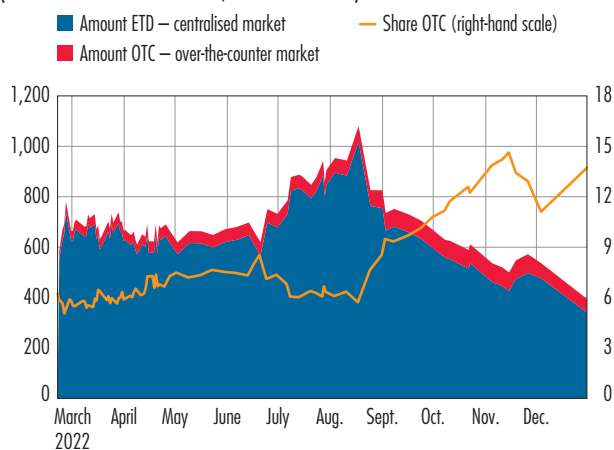
Risks could resurface and be exacerbated by a disorderly energy transition

Ultimately, the Russian natural gas supply shock poses both direct and indirect risks to financial stability. Its repercussions are direct through the increase in wholesale gas prices and their volatility, and indirect through macroeconomic second-round effects and the price correction mechanisms put in place. While the fall in TTF prices over the last few months has helped to limit this, these problems could return with a vengeance in the winter of 2023-24.

Beyond the 2022 crisis, this episode illustrates the consequences that could result from a disorderly energy and climate transition, in which energy supply and demand were subject to major imbalances. Such a scenario could lead to major disruptions and price volatility that could be difficult for energy players to manage, with significant consequences for financial stability. It is therefore essential to create the conditions for a co-ordinated rather than imposed energy transition. This is one of the objectives of the REPowerEU plan (European Commission, 2022), adopted in response to the energy crisis, and which takes account of the challenges associated with the energy transition.

C5 Share of centralised and over-the-counter trading in natural gas derivatives

(amounts in EUR billions, share as a %)



Sources: Depository Trust & Clearing Corporation (DTCC), EMIR data; Banque de France calculations.

Notes: First data 21 February 2022, last data 30 December 2022. Gross notional amount of contracts traded by at least one French counterparty. OTC, over-the-counter; ETD, exchange-traded derivative.



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