conseil d'analyse économique
French Council of Economic Analysis

Focus
No 93
april 2023

European Gas Market: Stakes, Priorities, and Potential Solutions

Markus Brunnermeier, Princeton University , **Sylvain Chassang,** Princeton University and member of the CAE

The deterioration of the geopolitical context, following Russia's invasion of Ukraine in February 2022, triggered a crisis in the European Union's energy system by leading to an 80% reduction in Russian natural gas imports, which represented 45% of European consumption in 2021. Despite effective consumption reduction policies, the natural gas market was severely disrupted in 2022, with its spot price rising from €80/MWh to over €300/MWh between January and August 2022. The rise in gas prices was transmitted to the electricity market as gas-fired power plants were often the last technology to be called upon to produce, setting the price on the hourly spot electricity market. The specific issues at stake in the electricity market are dealt with in the CAE's *Note* No 76 "The triple challenge of the reform of the European electricity market".

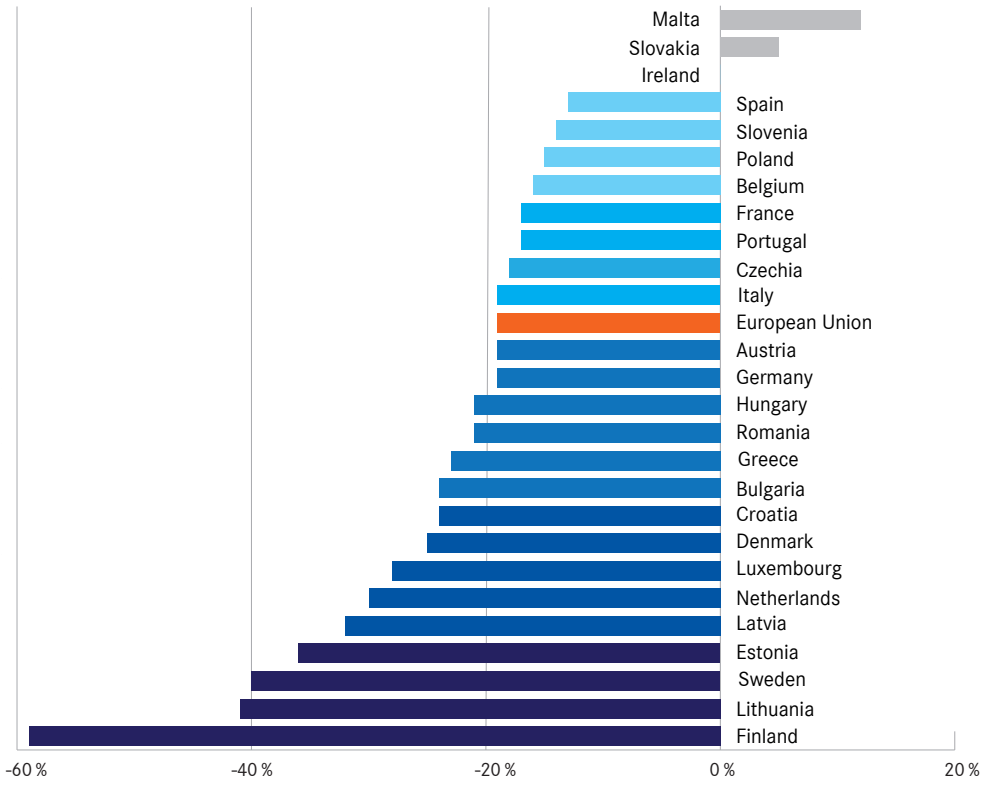
The purpose of this *Focus* is, in addition to the *Note*, to set out the considerable challenges linked to the gas market, and the strong uncertainties surrounding the future of the European energy in the short term. Although gas prices have returned to pre-2022 levels in the early spring of 2023 and there are no expectations of higher prices in the coming year, this does not mean that the crisis is behind us. Indeed, there are many sources of disruption that could lead to a new price surge: a cold spring or hot summer in the northern hemisphere, a winter drought in Latin America reducing hydroelectric production, a macroeconomic recovery in China, the world's largest consumer of LNG, a disruption of Russian pipelines that still supply 10% of European needs, an industrial accident, such as the one at the Freeport liquefaction terminal in Texas, or sabotage, such as the one on the Nordstream pipeline in September 2022. This Focus sets out the priorities for reducing this uncertainty and proposes several levers to adapt to the changing context.

Far from being powerless, the European Union has leverage to effectively manage the current energy crisis. To develop an effective and proportionate response, the first essential step is to improve our information on the supply plans of the major gas market players, their exposure to short-term price volatility, and to reduce the uncertainty about the effectiveness of public actions. Second, while joint gas purchasing at the European level is a reasonable response to the energy crisis, we emphasize the fact that its success will depend on its implementation: several adjustments regarding the organisation of negotiations and allocation mechanisms are open to European players seeking to build such a project in the months to come.

Since Russia's invasion of Ukraine in February 2022, the European Union's energy system has been in crisis. The deterioration of the geopolitical context has led to a reduction of 80% of Russian natural gas imports, which represented 45% of European consumption in 2021.

Despite effective consumption reduction policies (see Figure 1), the natural gas market was severely disrupted in 2022 (see Figure 2), with its spot price rising from €80/MWh to over €300/MWh from January to August 2022.

Figure 1: Reduction of Gas Consumption in Europe



Source : Eurostat - Comparison between the consumption over the period august 2022- january 2023 and the average consumption over the same period in 2017-2021.

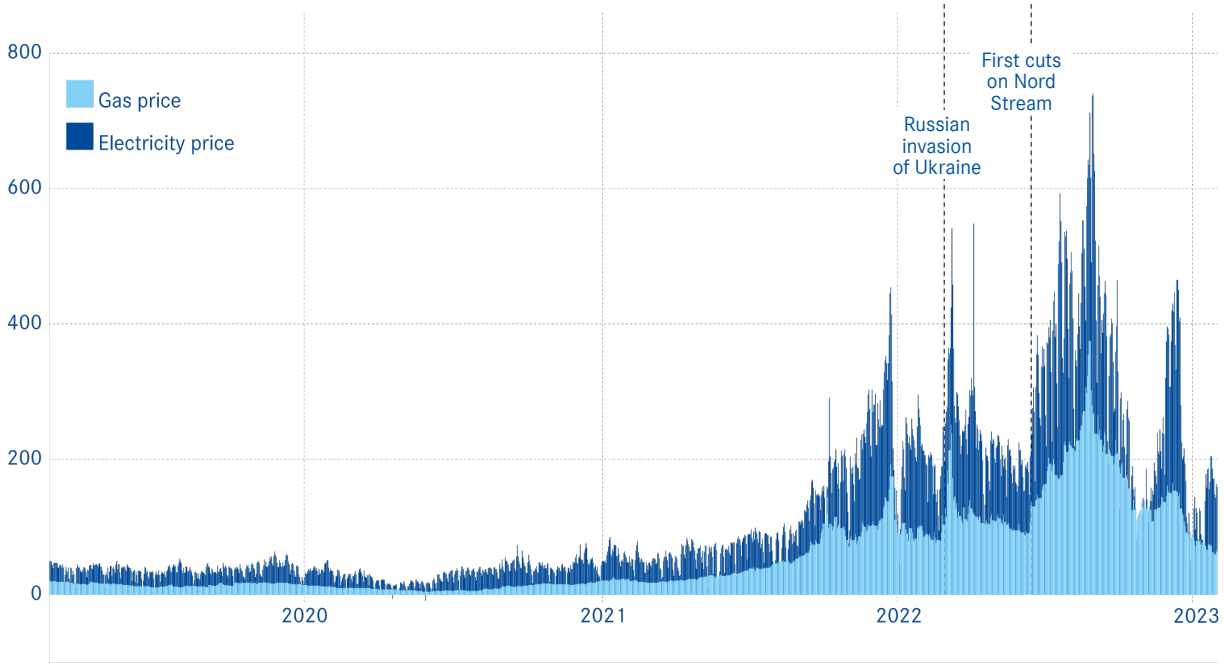
The increase in gas prices was transmitted to the electricity market: gas-fired power plants were often marginal electricity producers, setting the price in the hourly spot electricity market. Issues specific to the European electricity market are discussed in the CAE *Note* No 76, Bureau et al. (2023), "The reform of the European electricity market: a triple challenge".

The purpose of this focus is to clarify the considerable stakes related to the gas market, and the uncertainty surrounding the future of European energy in the short term. It outlines the priorities for reducing this uncertainty and proposes several levers to adapt to the changing context.

1. Uncertainty over gas supply for the year to come

Gas price regulation is a major issue for Europeans. For example, France and Germany consume nearly 450 TWh and 850 TWh of gas annually, and must replenish reserves of 130 TWh and 250 TWh by November 1, 2023. Although prices are lower in the winter of 2023 than in the summer of 2022, with prices around €60/MWh in January 2023, annual French and German consumption would be valued at around 1% and 1.3% of GDP. If gas were to reach the ceiling price of €180/MWh, the potential consumption costs would rise to around 3% and 4% of GDP. For reference, when Russian supplies stopped in the summer of 2022, the price of gas soared to €350/MWh. Without coordination, the same phenomenon is likely to occur again.

Figure 2: Gas spot price volatility since 2019



Source: Electricity (France) : Ember Climate from ENSO-E. Gas (not specific to France) : daily historic data on the TTF market, opening price

There are currently no expectations of rising prices for the coming year: forward prices for gas delivered next winter fluctuate between €40 and €60/MWh on the main gas market in Europe, the TTF (see Box 1). However, this does not mean that the crisis is behind us: a surge in prices in the weeks or months to come is always possible. Indeed, the volumes traded on futures markets are too low to allow large importers, or governments implicitly exposed to gas price increases, to cover their risk. Thus, it is likely that large European importers remain highly exposed to the spot price of gas - data to assess this risk are not currently available.[1]

The potential sources of disruption are numerous:[2] a cold spring or hot summer in the Northern Hemisphere, or a winter drought in Latin America reducing hydroelectric production;[3] macroeconomic recovery in China, the world's largest consumer of LNG; an interruption of the Russian Yamal and Turkstream gas pipelines which still supply 10% of European needs; an industrial accident, such as the one at the Freeport liquefaction terminal in Texas, which reduced US LNG export capacity by 20% from June 2022 to March 2023;[4] sabotage, such as that of the Nordstream gas pipeline in September 2022.

To reduce these risks, the European Commission is setting up two mechanisms whose effectiveness is still uncertain:

A cap – subject to conditions – on the price of TTF gas at €180/MWh.[5] This measure seems mainly symbolic, but may help by providing a reference point for what price should be considered too high. The price cap regulation is limited because it does not cover over-the-counter markets and ceases to apply in the event of supply disruption. Moreover, no provision has been made to reduce consumption or manage potential rationing.

[1] In addition, the predictive power of futures prices to forecast future spot prices is not very high and varies across commodities. See e.g. Chinn et Coibion (2014).

[2] «Have LNG and gas markets returned to normality in 2023?», *Platts Commodity Focus*, 2023/02/14.

[3] «Worst Drought in 91 Years Turns Brazil Into Hot Spot for LNG», *Bloomberg*, 2021/06/03.

[4] «US gas export plant hit by blast reopens with uncertain future», *Financial Times*, 2023/02/20.

[5] See Council Regulation (EU) 2022/2578 of 22 December 2022 establishing a market correction mechanism to protect Union citizens and the economy against excessively high prices. The conditions for activating the mechanism are as follows: 1) one-month forward prices reach more than €180/MWh on the TTF index for three working days and 2) prices are above the world price of LNG by at least €35 , during these same three days. It is automatically deactivated if there is an increase in gas consumption or in the event of supply at risk.

The implementation of a demand aggregation platform, which we refer to as a "joint purchase board" (JPB)[6], allowing grouped purchases. The implementation of this platform faces two main difficulties. First, incumbent players such as Engie, Uniper, Eni show limited interest in the platform, even though their participation is key. Second, the antitrust branch of the European Commission has not yet clarified the conditions under which group-buying could be allowed.

In this context, it seems to us a priority to better understand the spot-price exposure of gas companies, and to understand as soon as possible the difficulties in coordinating possible grouped purchases.

Depending on the needs revealed, we propose several possibilities to adapt existing policies.

Box 1. **Gas supply organization and the growing role of liquefied natural gas**

About 75% of European gas imports arrive by pipeline from Norway, Algeria and Russia. The massive reduction in Russian exports has been offset by an increase in LNG imports (25% of imports), particularly from the United States, whose exports to Europe have almost doubled in 2022 and represent 45% of European LNG imports. It is the LNG market that offers margins for adjustment in response to the European energy crisis.

The LNG supply chain[1] — production, liquefaction, shipping, regasification, storage and pipeline transportation — brings together a mix of public and private players. About 60% of the world's production is allocated through long-term supply contracts (mostly between 5 and 20 years), but often allowing for re-export to other destinations. The increase in prices linked to the increase in European demand is thus reducing Asian demand. As an example, Japan decided in September 2022 to restart nuclear power plants. This allows Japanese importers, who hold long-term contracts, to re-export part of their supplies to Europe at a profit.

The rest of the production (especially from the US) is allocated via short-term contracts. An increasing proportion of the new long-term contracts signed (in 2022, 44%) are held by trading companies, such as Shell, Total, Vitol, or Trafigura, which then allocate these resources on a shorter-term basis according to market needs.

In 2021, the two stress points in this gas chain were production and access to regasification terminals in Europe. The spot price of LNG delivered in Europe briefly fell below 0 in November 2022 due to saturation of receiving capacity. The rapid commissioning of Floating Storage Regasification Units (FSRU), particularly in Germany and the Netherlands, is expected to alleviate this problem in 2023.

The majority of gas delivery contracts are signed bilaterally, on private terms. A smaller part of gas trading takes place on open market platforms, allowing the exchange of physical gas and futures contracts. The two reference markets in Europe correspond to specific gas delivery points: the Title Transfer Facility (TTF), based in the Netherlands, and the National Balancing Point in the UK. It is the TTF that is subject to a cap of EUR 180/MWh.[2] Although these markets represent a small part of the trade, they play an important role because gas delivery contracts are often indexed, at least in part, to these market prices, as well as to indices such as Platts Northern Europe, and Platts JK.

[1] Source : GIIGNL.

[2] « Union européenne : un plafonnement des prix du gaz en vigueur le 15 février 2023 », *Vie Publique*, 2023/01/10.

2. How to reduce uncertainties? infrastructure security, information sharing and experimentation

2.1 Ensure infrastructure security

The industrial accident at the Freeport liquefaction terminal, the sabotage of the Nordstream gas pipeline and the technical difficulties encountered by the Dutch FSRUs[7] demonstrate the fragility of energy infrastructures. In a tense geopolitical context, we do not think it is out of the question that these infrastructures will become the target of sabotage actions next winter. Increased international cooperation to protect the infrastructures and in particular the interconnections of the energy network seems first order. We do not elaborate on this security priority — it is not our expertise — but we believe it is essential. The economic priorities that we detail below are subject to it.

[6] See Council Regulation (EU) 2022/2576 of 19 December 2022 strengthening solidarity through better coordination of gas purchases, reliable reference prices and cross-border gas exchanges.

[7] « Dutch LNG terminal at Eemshaven unable to deliver until Jan 30 », *Reuters*, 2023/01/13.

2.2 Take stock of the situation

We lack the data needed to determine the exposure of industrial gas importers and consumers (e.g. Engie, EDF, Eni, Uniper, E.On) to the spot price of gas. If these companies have been able to conclude supply contracts for 2023 at stabilized prices close to the price of futures contracts on the TTF, then the current decline in gas prices is indeed reassuring, and strong action by governments is probably not necessary. If, on the other hand, industrial gas consumers remain largely exposed to the spot price of gas, then preventive action by governments is justified.

To answer this fundamental question, we propose to carry out a prospective survey of the supply of the main European importers and consumers. This survey could be carried out in cooperation with industry associations, such as GIIGNL (the association of major LNG importers), or GIE (the group representing energy transport infrastructure operators in Europe). These two organizations regularly collect data on gas exchanges, contracts signed, as well as the use of regasification, storage and pipeline infrastructure.

Proposition 1. Assess and coordinate operators supply plans

In concrete terms, we propose to measure:

- anticipated gas requirements by quarter for the remainder of 2023;
- the gas supplies already secured, and their exposure to the spot price;
- gas needed but not yet secured.

In addition, to better coordinate inventory replenishment and receiving terminal utilization, it would be desirable to establish 6-month delivery schedules.

The information collected from companies would remain private, and would be aggregated to preserve the anonymity of individual positions. Items of concern would be shared regularly with relevant gas importers, including periods of anticipated high spot demand, and periods of potential congestion at regasification terminals.

2.3 Experiment with joint gas purchases

The Joint Purchase Board planned by the European regulation of December 2022 faces three types of risks:

- a regulatory risk: the European Commission has still not ruled on the treatment of purchasing consortia under competition law. This strongly limits the appetite of European buyers to pool their purchases.
- a lack of technical expertise: negotiating contracts on the gas markets requires mastering a complex logistics chain, and requires expertise that the intermediaries mandated by the European platform may lack.
- a refusal to participate by incumbents, whose incentives to reduce the spot price of gas are unclear (e.g. Engie, Eni, and Total achieved record profits in 2022).

We think it is a priority to conduct joint purchasing experiments early to better understand these difficulties and how they can be solved. Experimenting early, and in the current state of the market, is easier because the stakes are not yet high. Insights gained from such an experiment would inform the ultimate design of the JPB.

Proposition 2. Experiment early with group purchasing to inform the operation of the common purchasing platform

In concrete terms, France and Germany could seek to purchase between 2% and 5% of their security reserves, to be delivered over 6 months. These quantities represent between 0.5 and 1.5 Mt of LNG, which corresponds to the range of short-term contracts usually signed. The tender could be open to other buyers, according to a pre-determined mandate (deadline, price range, quantity).

This experiment will:

- create case law, making the Commission rule on the antitrust aspects of this consortium, and the conditions under which the group purchase of gas can operate;
- clarify whether incumbents will cooperate with this effort, or whether broader competition is needed;
- deepen government expertise in the negotiation and logistics of gas contracts that will enable better operation of the JPB;
- activate early negotiations with American sellers who should eventually be the preferred partners for joint gas contracts for European buyers; in particular, it would be useful to determine early on the appropriations of offering shale gas extractors medium-term contracts at a price sufficient to maintain their production capacity, so that it will be available in case of need in 2023 and 2024;
- clarify the proper way to structure the negotiation mandates given (what size of contract, what time frame, what price range);
- clarify how to allocate the supplies obtained in the event that the capacity is oversubscribed.

3. Possible Policy Adjustments

In the event that European players turn out to be very exposed to the spot price of gas, or if the implementation of group purchases is difficult, we propose some possible policy adjustments.

3.1. Proposals to improve the efficiency of the JPB in the event of difficult implementation

As the recent European Commission proposal suggests, European consumers can benefit from aggregating their demand (see box 2). The Japanese experience in organizing LNG purchases through consortia shows the effectiveness of having a single experienced negotiating team representing the interests of several importers. This allows for greater bargaining power, but also for a more efficient and attractive arrangement for sellers by ensuring stable demand levels on a significant scale.

However, buyers have expressed reluctance regarding the JPB. There are two potential reasons for this:

1. European importers have legitimate concerns about the effectiveness of the JPB, and do not want to lose control of their supply process.

2. The JPB could reduce the intermediation rents of large European operators, particularly in the event of an increase in the spot price.

Furthermore, the European Commission's draft provides few details on the organization of the negotiation between buyers and sellers, but the way in which the negotiation mandates are structured has a profound impact on the success of the negotiations.

Depending on the results of the joint purchasing experiment we propose above, several adjustments can be considered.

One possibility is to set up a trading mandate market using a design similar to crowdfunding:

- Lead buyers (e.g. the French and German governments) or lead negotiators (e.g. a company with the necessary expertise such as Engie, Trafigura, or Tokyo Gas) submit negotiation mandate proposals. They specify the negotiation objectives (prices, quantities, delivery schedule) and the conditions for activating the mandate (minimum capital raised to start the negotiations), as well as possible *success-fees;*
- Within a short period of time (e.g. a few days), buyers can commit to join the proposed negotiation mandates, and put forward appropriate capital. If the minimum collection target is not reached, the committed capital is immediately returned to potential buyers;
- If negotiations begin but are not successful in a timely manner, say after one month, participants can claim their funds back.

This design achieves several objectives:

- It reduces the risk of participating in the JPB by quickly returning capital to importers in the event of a failed joint purchasing mandate.
- It allows participants to choose who represents them.
- It strengthens the ability of lead negotiators to negotiate by requiring them to commit to terms and deadlines in advance.

If incumbent European operators do not wish to participate in a joint purchasing system, even if it is designed to reduce the supply risk they bear, then broader competition will be required, with international operators (notably from the United States and Japan) explicitly invited to act as lead negotiators.

Box 2. **When Joint Purchasing Can Help Europeans?**

Japanese importers, historically the largest consumers of LNG, have a long history of joint purchasing, particularly for long-term contracts. In practice, a negotiating mandate is given to a team representing multiple companies, which commit to purchase a predefined proportion of the supply obtained. From a seller's point of view, this approach can be attractive because it allows to secure a larger part of its sales and to simplify its customer interactions. From a buyer's perspective, this approach allows for better pricing, mutualization of counterparty risk, and increased flexibility in individual deliveries.

The ability of negotiators to obtain better prices depends on the mandate they are given. The seller must internalize that asking for a high price may lead to a failed negotiation. To do this, it is important to give the negotiators firm objectives, as well as a limited negotiation time. Furthermore, it is important that the represented buyers commit themselves not to immediately outbid each other privately if the joint negotiations fail.

It is fair to wonder what impact European coordination can have on LNG prices. Historically, Europe accounts for less than 30% of imports, compared to 70% for Asia, in particular Japan, Korea and China. Still, we believe the potential impact is high. First, 30% of imports is not a negligible market share. More importantly, in a high spot price situation, let's say if we were to reach the 180 EUR/MWh cap, the European market share would be much higher, and coordination likely to have a significant impact.

From an antitrust perspective, it is true that in some circumstances, joint purchasing can be a barrier to competition that reduces the efficiency of markets. We do not believe that this is the case here. First, coordination between private actors - whose goal is to maximize profit – has a very different social impact than coordination between public actors – who incorporate broad social objectives. Moreover, the market for short-term gas supply is highly concentrated. In such a case, coordination among buyers tends to improve rather than reduce market efficiency.

We note that the organization of joint purchasing groups has been at the heart of European construction. As early as the First World War, the Allies organized a joint purchasing group for maritime freight. After the Second World War, the ECSC coordinated reconstruction efforts to make the best use of the limited resources of the Marshall Plan, and to reduce the rents captured by the cartel of coal and steel manufacturers.

3.2. Plan measures to reduce consumption as prices rise

Europe's proposed gas price cap lacks provisions for managing demand in the event of a price increase. It would be beneficial to reduce demand before the cap is reached, and plan out how to manage shortages and rationing if the cap is reached. Moreover, this symbolic ceiling should not be seen as a guarantee of stability, allowing companies and households not to prepare for consumption cuts.

To better support the procurement efforts of purchasing consortia and encourage business and household adaptation, states should plan and announce a sequence of consumption reduction targets to be implemented at different price levels as prices rise. Possible measures to achieve such targets are diverse and can be specified at a later stage. For example, one can think of exposing final consumers to an increasing portion of the spot price, but also of ramping up public encouragement to reduce demand, or of giving consumers individual demand reduction targets.[9] As shown in Figure 1, the response of European economies during the winter of 2022 was very encouraging.

Encouraging a gradual reduction in demand is desirable for two reasons:

- This will help reduce prices by increasing the speed at which demand contracts when prices rise. This is the main strategy used by buyer cartels to reduce the prices they face.

- This will make it easier for European economies to adapt to potential disruptions, by preparing adaptation measures in advance of any serious disruptions.

These efforts to reduce demand will be much more effective in terms of reducing prices if European countries coordinate on the objectives to be achieved.

3.3. Prepare a fair and efficient allocation mechanism for available supplies

One difficulty that joint purchasing consortia face is the allocation of supplies obtained in the event of excess demand. This can happen if supplies are lower than expected, or if shocks (e.g., a weather shock) increase buyers' needs. In such a situation, there will be a strong temptation for the players with the most acute needs to go unilaterally to the spot market to buy the supplies they need at high prices. Such behavior undermines the effectiveness of joint purchasing, and must be contained as much as possible: a buyer that deviates secures their supply by increasing the spot price for their partners and enriching LNG sellers.

A solution to this challenge is to organize an internal LNG reallocation market among the members of the buying group. In this way, a buyer whose needs are higher than expected can obtain the necessary supplies by compensating its partners, rather than by increasing the market price. However, it is necessary to ensure that the internal price of the buying group remains equitable. One possibility is to constrain the internal purchase price to remain below a predefined average between the realized spot price and an estimate of the spot price that would occur if buyers were to bring their demand to the spot market.

This type of mechanism can be used at several levels: between participants in the joint purchase board, between consumers in the same country if rationing were to be implemented, or even between countries if rationing were to be implemented at the European level (as in the historical case of the ECSC).

In the latter two cases, the internal reallocation mechanism could take the form of a *cap-and-trade* mechanism for consumption permits:

- Given the available capacity, gas consumers are allocated consumption permits in proportion to their historical consumption.
- Gas users can trade these permits on an open market.
- Users can purchase gas at a regulated price within the limits of their permits.

This mechanism has four attractive properties:

- It is fair and reflects an implicit social contract between citizens: each user is entitled to a reasonable minimum share of the available capacity.
- It is efficient: permits can be exchanged at will.
- It is cooperative: users with significant needs can obtain supplies by compensating their European partners, rather than by increasing the rents of exporters.
- It can rely on the know-how and IT infrastructure developed within the European Emissions Trading System.

Such a mechanism could be implemented between or within countries. However, citizens should be the main beneficiaries of any resale of consumption permits.

We believe that experimenting, at least on a small scale, with such a mechanism would be a useful investment in economic security, especially since such mechanisms can be used in other contexts (e.g., managing a supply shortage on the electricity grid).

[9] Announcing these measures in advance also strengthens the market power of European buyers by increasing the credibility of a contraction in demand in response to a price increase.

Conclusion

Far from being powerless, the European Union has many tools to effectively manage the current energy crisis. To develop an effective and proportionate response, the first essential step is to improve our information concerning the major market players' supply plans, their exposure to short-term price volatility, and to reduce uncertainties on the effectiveness of public policies.

While joint purchase of gas at European level is a reasonable response of the energy crisis, we emphazise that its success will depend on implementation details: several policy adjustments regarding the organization of bargaining mandates, and supply allocation mechanisms may prove useful to European stakeholders seeking to realise the benefits of joint purchases.