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Article

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An EU Price Cap for Natural Gas: A Bad Idea Made Redundant by Market Forces

When the price of natural gas on the major European exchange, the Title Transfer (TTF) in Amsterdam, spiked to over €300/MWh in the summer of 2022, a number of EU member states demanded a price cap on natural gas inside the EU. The argument was that the TTF price was driven by speculation. It did not reflect the average price actually paid by EU importers.

Under pressure from this group of 15 member states, the Commission made a proposal for a dynamic price cap under which a cap would be imposed if the TTF price exceeded a certain value for a number of days. After some tight negotiations, the European Council agreed in December on a price cap of €180/MWh.

TTF prices have been falling since the summer peak of 2022, and are now (January 2023) around €60-€70/MWh, very far from the value at which the EU limit would become operative. The European price cap has thus become a paper tiger.

What is the EU price cap?

The European Commission (2022a) calls it a "Market Correction Mechanism to protect EU businesses and households from episodes of excessively high gas prices in the EU" with a "safety ceiling on gas prices". Officially it is thus not a price cap, but a safety ceiling. Looking closer, one sees that this safety ceiling will not concern the price for natural gas charged to consumers and industry, but only the quoted prices on the TTF. The European Commission (2022a) specifies that when the ceiling, or rather "price correction mechanism" enters into force: "orders for front-month TTF derivatives exceeding the safety price ceiling will not be accepted".

In practice, this means that the TTF will cease to function at this point. The real question is then: what happens once TTF orders above €180/MWh have been forbidden? What should an industrial consumer or a local utility do when it needs gas at that point, but cannot get it below €180/MWh? In practice, there would be rationing, or a grey market will arise under which EU customers who need gas will contact foreign suppliers directly and pay whatever price these suppliers charge.

The role of spot exchanges like the TTF: Marginal versus average price

A confusion of the role of the TTF is at the heart of the debate. Most gas is supplied under long-term contracts (running often over decades). A spot exchange like the TTF is thus used only for the small additional quantities that an industry or utility needs (or has in surplus) because there is always some difference between the expected gas needs and actual demand.

The TTF thus represents only the marginal price for smaller quantities of varying amounts. This changed fundamentally when Gazprom cut most of its deliveries to Europe in early summer of 2022. This forced the customers of Gazprom, who had relied on their long-term contracts to go to the TTF to find the missing quanties. Moreover, demand for gas increased beyond the seasonal pattern because of new regulations on minimum storage levels which meant that many were scrambling for the little gas still available, i.e. the small quantities not committed under long-term contracts. The increased demand originated mainly in Germany, which had been the main customer of Gazprom until that point and which has the largest storage sites in the EU. This is why demand outstirpped the normally available supply by far.

But these gyrations of the TTF price were threatening to spill over into the wider market. The average price paid by importers is determined by the long-term contracts, in which the price is usually indexed to some reference value to keep it close to the real value of gas. In the past, most long-term gas contracts were linked to the oil price because crude oil constitutes a close substitute for natural gas in electricity generation. Over the past years, so-called gas-to-gas indexation has become more important, with the contract price indexed on some spot price, which could be the TTF, but could also be other market prices. This is where the TTF quotations become relevant.

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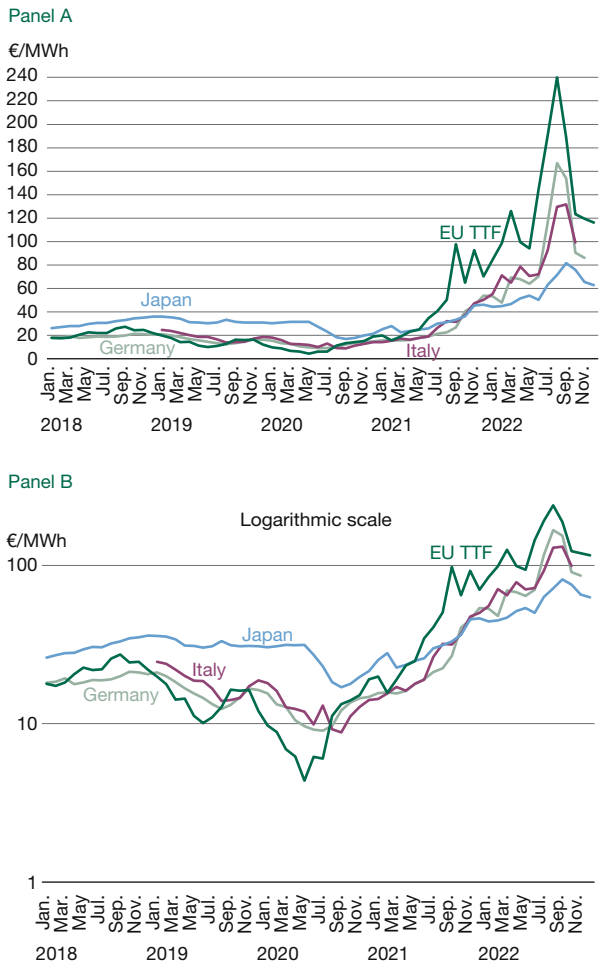
Figure 1
Natural gas unitary price



Note: TTF is Title Transfer.

Source: Author's calculations based on national trade statistics.

A higher TTF spot price can influence the prices paid by importers to the extent that long-term contracts contain indexation clauses referring to the TTF. However, in reality the feedback loop between the TTF (=marginal price) and average prices is rather slow.

A difference between the marginal and the average price could be observed during the COVID-19 recession, which saw a temporary glut that led to very low spot prices. But the actual prices paid by importers declined only slightly so that the TTF price was lower than the average price paid by importers. Figure 1 shows the unitary prices calculated from national import statistics by dividing the value of gas imports (in euro) by the volume (in cubic meters or MWh).

During periods of low demand (2019 and early 2020), the TTF price was below the average price paid by importers. This changed already in mid-2021 when the TTF price began to increase rapidly because of stronger than anticipated demand in Asia. After Russia's invasion of Ukraine, the TTF price increased even further, but the average prices paid by importers increased less than proportionally. It was this difference between the average prices paid by importers and the TTF price (at its peak close to €80-€100/MWh) that underpinned the argument that the TTF price did not represent actual prices because it was driven by speculators.

Panel B of Figure 1 shows the same prices on a logarithmic scale to allow a comparison in relative terms. A vertical distance between two lines corresponds to a proportional, not absolute difference. It is apparent that the average prices paid by the two major EU importers (Italy and Germany) remain very close and that the vertical difference between the TTF and the average import prices paid in these two countries was very similar (but with opposite sign) in the summer of 2022 and early 2020. The difference TTF to average prices was thus not exceptional in 2022.

Figure 1 also shows the average price paid by Japanese importers, which until mid-2021 was much higher than those paid by European importers, but then increased much less. The key reason for this is that Japanese importers of natural gas still have mostly contracts indexed on crude oil, the price of which has increased much less than that of natural gas. The rationale for this choice of contracts is that in Japan some power generation still uses crude oil (Federation of Electric Power Companies of Japan, n.d.).

External effects from national price caps and similar measures

The EU has no competence to regulate the prices at which private agents exchange gas at the wholesale level, whether inside the EU or when dealing with foreign suppliers. Given the dependency of the EU on foreign suppliers, it is impossible to lower the price for businesses and households by EU fiat. National governments can of course interfere with the prices charged to households and industry. But they can only cover the difference between the lower price charged to consumers and the price paid to importers with public funds. The companion contributions in this Forum describe in detail the measures taken in the larger EU countries to protect consumers and industry.

A national price cap that subsidises the prices paid by consumers diminishes the incentives to save on gas. This has an important impact on the market.

The starting point for any analysis of the gas market is that increasing the production of gas takes time. Contrary to oil, there is little spare capacity in gas because it is technically

difficult to change (reduce or increase) production from an existing field. However, for Europe, supply is not a given; it depends on the global price that induces consumers elsewhere, especially in Asia, to use less gas (Hama, 2022; Gros, 2022b).

This implies that while one can take the global supply of gas as a given in the very short run (i.e. the last few months of 2022), Europe can increase its imports if it is willing to pay a higher price.

The marginal benefit from any additional quantity not consumed is the change in the gas import bill that arises because of a reduction in the European demand. Any gas saved in the EU has two effects on the overall import bill:

1. it reduces the import bill at the given price;

2. it reduces the price paid by all other EU importers because demand for gas (liquefied natural gas, LNG) is lower.

A first immediate corollary is that the benefit of savings (or the cost of additional imports) is higher than the price. How much higher depends on the (inverse of the) elasticity of foreign supply.

This elasticity of gas available for import by the EU must be assumed to be very low in the short run because it is based on consumers elsewhere reducing their gas use, thus liberating some gas for Europe. One should thus assume that it is of a similar order of magnitude as the elasticity of demand within Europe, which is often estimated at only 0.1 (but with the opposite sign).

This simple consideration shows that the benefit from importing one cubic metre of gas less is much higher than the price quoted on the spot market. With a rather inelastic supply (as one must assume since demand abroad is likely to be as inelastic as demand in Europe) the benefit could be several times higher. For example, an elasticity of foreign supply (or the elasticity of household demand abroad, i.e. the countries from which the additional LNG would have to come from, like Japan or Korea) of only 0.1, would lead to the conclusion that the marginal cost of gas is 11(=1+1/0.1) times higher than the price (Gros, 2022a).

The intuition behind this result is straightforward: each unit of gas not consumed in Europe diminishes demand on the LNG market, which is (in the very short run) very inelastic. This means that even a small amount of gas saved in Europe can have a large impact on the price and thus on the cost of importing all gas.

The key problem is that any individual gas consumer or individual government does not take this effect into account because an individual consumer (or a single member country) accounts only for a fraction of EU consumption.

This explains why individual governments have tailored their domestic actions to protect consumers and industry exclusively to national concerns, ignoring that their actions affect the import price of the entire EU. There is thus an external effect operating. Each individual government does not face a strong incentive to encourage gas savings at home.

Neglect of this external effect has been particularly important for the subsidies enacted by some member states for energy-intensive industries to allow them to continue production and for Spain, which subsidises the cost of gas for power generation. These policies impose enormous economic costs on the entire EU.

A similar reasoning applies to subsidies in industry. Instead of promising cheap gas, government should offer energy-intensive industries subsidies to close down temporarily or at least diminish production. However, individual countries do not follow these types of policies because they do not take into account the impact of their actions on the import price for the entire EU. Individual national governments only see that others subsidise their industry and feel justified to do the same.

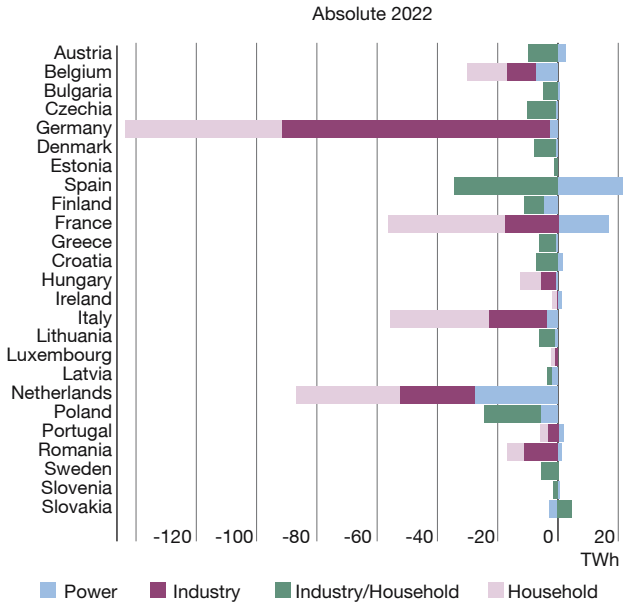
While there should be a strong interest at the EU level in incentivising gas savings and encouraging member states to follow this policy, there is little that can be done to force countries to change their policies. The "Save Gas for a Safe Winter" Plan of the European Commission (2022b) contains only a voluntary gas demand reduction target of 15% from 1 August 2022 to 31 March 2023.

So far, so good: Substantial savings bring Europe through the winter

Discussions about energy price caps have almost ceased in early 2023 as natural gas prices have fallen back to the level they had before the invasion (€60-€70/MWh). This is due to a combination of warm weather and gas savings by consumers and industry. The importance of the milder weather for residential consumption is well known, but it appears that households have reduced gas demand irrespective of the milder temperatures.

The reduction of gas use in industry is clearly due to shifts in energy use because industrial production has not fallen in 2022. This implies that while some energy-intensive industries might have curtailed production as natural gas became too expensive, other industries have increased output. This is a sign that the overall elasticity of demand in industry has been higher than expected.

Figure 2
Sectoral demand reductions 2022 compared to average 2019-21



Source: Bruegel, https://www.bruegel.org/dataset/european-natural-gas-demand-tracker.

A significant proportion of natural gas (about a third) is used to generate electrical power. The proportion varies from country to country and during the day since natural gas turbines are the most flexible way to increase power output when needed. This is why consumption of electricity also plays a role in gas demand.

In evaluating overall gas consumption patterns, one needs to look at three sectors: power generation, industry and households.

Figure 2 shows the absolute amount of gas savings by member state (defined as the reduction in gas consumption in 2022 relative to the 2019-21 average) for these three sectors. All member states (except Slovakia) recorded a fall in gas use. However, a number of member states show an increase in gas used for power generation, with the largest increases recorded in France and Spain. For France, the increase is due to the reduction of output of nuclear power stations. For Spain, the subsidy for the use of gas in power generation must have been one key reason.

Overall gas use for power generation across the EU27 declined marginally in 2022 because the increases in France and Spain were more than offset by falls in Belgium and the Netherlands.

With gas for power use nearly constant, savings were mostly in industry and the household sector. The bulk of total savings came from just a handful of countries. The biggest contributions came from just three countries: Germany, Italy and the Netherlands. For France, a large reduction in household and industry demand is offset partially by increased use of natural gas in electricity production. For Spain, the increased use of gas in power production almost completely offset the savings of direct gas use by households and industry.

The reason for this difference in gas savings can be seen in the large differences in gas and electricity prices. Figure 3 shows the latest data from the Household Energy Priced Index (HEPI) portal, which reports the residential prices charged under new contracts in EU member states (and the UK). The biggest differences are in electricity prices shown in the left-hand panel, which range from above 50 euro cents per kWh in Germany and Italy (dark green) to around 20-25 euro cents per kWh in Spain and France. Residential electricity prices in Germany and Italy (and the Netherlands) are more than 100% higher than in France and Spain. It is thus not surprising that in these two countries, natural gas use for power production increased. France and Spain account for the bulk of the overall increase in gas use for power. Natural gas prices, shown in the right-hand panel of Figure 3, differ somewhat less: based on December 2022 data, it was slightly above 21 euro cents per kWh in Italy and Germany against about 15-16 euro cents per kWh in France and Spain (a difference of 4%).

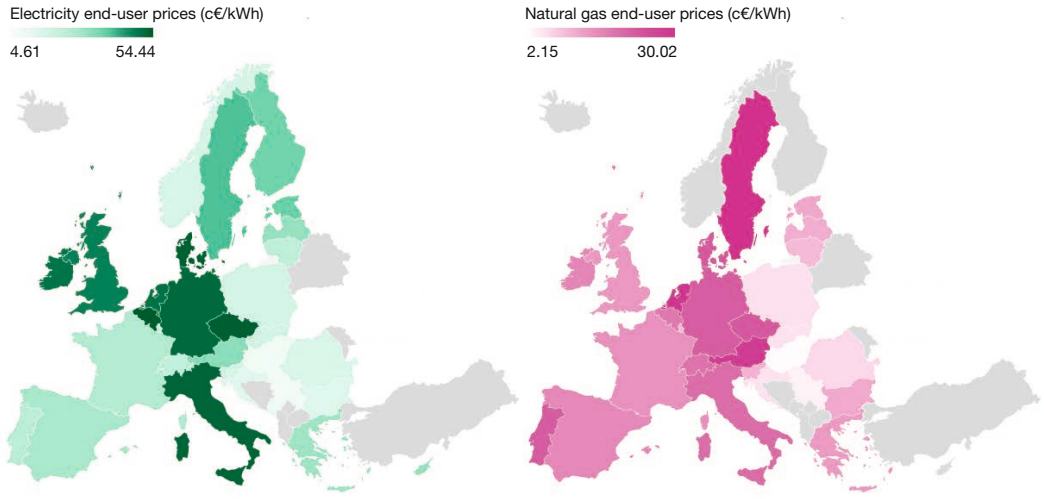
Figure 3 shows the level of residential energy prices. What matters for energy savings is the increase in prices, which is in this case closely related to the level in 2022. As described in Andreas Rüdinger's (2023) contribution in this Forum, in France, residential electricity prices barely increased, whereas they more than doubled in Italy and increased considerably in Germany as well. Spain is one of the few countries where electricity prices fell in 2022. These differences in energy price caps and subsidies also explain the large differences in headline inflation (Gros and Shamsfakhr, 2022), which is lower in France and Spain than in Italy or Germany (and most other member states as well).

In the case of Germany, one has to keep in mind that the price cap announced under the big €200 billion package (*Doppel-Wumms*) enters into force only in early 2023. This means that the 2022 data is not affected by any price subsidies in Germany because, up to the end of 2022, the German government paid only lump sums to vulnerable groups. By contrast, in France and Spain, price caps on electricity and gas have been in force for most of the year 2022.

Conclusions

With Russian gas no longer available to Europe, natural gas became a very scarce and very expensive resource

Figure 3
Residential electricity and natural gas end-user prices



Source: HEPI by Energy Control Austria, © MEKH and VaasaETT 2023. Created with Datawrapper

in the summer of 2022. The peak prices reached on the European spot exchange, the TTF, went up to over €300/MWh, 20 times previous levels, prompting calls for a European price cap. A European market correction mechanism was agreed in December, but upon closer inspection, represents a paper tiger.

Market prices have rapidly fallen into early 2023 as it has become apparent that the elasticity of demand in those major EU gas markets where prices were allowed to increase was much higher than anticipated. Helped also by relatively mild weather, the EU is on course to reach its target of lowering demand during the winter by 15%. Since prices still remain elevated, one can expect these savings to become permanent. Moreover, supply should slowly increase over time. These factors support a much more benign outlook for gas prices.

The impact of energy subsidies in France and Spain has thus been limited. Nevertheless, they generate negative externalities for the remainder of the EU and should thus be very carefully scrutinised by the Commission. It should not just apply state aid rules for aid to industry. The Commission should also scrutinise the disincentives for gas savings that result from subsidies to households.

The justification is that the EU does not have common targets for the reduction of gas use. Reductions have been partly (for now) achieved through higher prices in some member states. The generalised price caps in France and the outright subsidy in Spain should be strictly temporary.

Moreover, the Commission should also pressure member states to abandon generalised price caps, which implicitly subsidise consumption. Targeted lump sum payments that do not change incentives constitute a much better way to spread the burden of high energy prices. Governments with fiscal space could also consider subsidies for gas savings, for example, by paying households for consuming less than in the past.

The broad conclusion is that gas or electricity price caps do not make sense. Luckily, the EU price cap has become irrelevant. But member states have created many new subsidies that the Commission should carefully monitor for their disincentive effect, and it should recommend that member states employ other social support measures instead.

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