Daniel Gros

Implications of Gas Scarcity for European Energy Policy

The nature of the "gas challenge" facing Europe has become crystal clear since the explosions which put the Nordstream pipeline(s) out of operation. Before it invaded Ukraine, Russia met over a third of Europe's gas needs. Its share fell until summer to less than 10 percent, and even this remainder seems destined to stop soon. European countries were able to compensate for the loss of Russian gas mainly through higher imports from other sources and energy savings, and allowing gas storage levels to increase more quickly than planned. More of both will be needed during the winter heating season.

All EU governments are desperately trying to find additional sources, mostly in the form of liquefied natural gas, LNG. But this takes time because most LNG is committed under long-term contracts. Some reduction in gas use in Europe during the next winter is thus unavoidable.

On the savings front, Europe's record so far has been a mixed bag. The high price of gas has already led industry to cut back and resort to alternative fuels or reduce production, with German companies using 20 percent less gas in June compared to last year. It seems that the price signal has had an impact on German industry. However, in other countries little reduction in gas consumption has occurred.

Industry accounts for the bulk of gas demand during the summer months because during the spring and summer little gas is needed for heating. Winter will be very different. During the heating season, demand for gas increases fourfold and most of this additional demand comes from households. European governments are already imploring consumers to turn down the thermostats and take fewer hot showers. But such appeals are likely to have little impact. In Italy, the government has decided to shorten the heating season by a few weeks – but this decision applies only to condominiums. Tightening rules for public buildings is expected to produce similarly small savings.

Ensuring that households take gas scarcity to heart will be crucial for getting Europe through the winter without having to resort to rationing. This will not be easy, since households cannot quickly switch fuel and, as the weather gets colder, it will be difficult to convince people to cut back on heating their homes.

A key element in reducing the fiscal cost of a gas savings subsidy is the fact that VAT revenues increase automatically with higher gas prices. Governments could rebate these revenues to those consumers who reduce their gas consumption. This would be much preferable to reducing VAT rates on energy in general, which lowers the price for all consumers and provides no incentive for savings.

KEY MESSAGES

- **The global supply of natural gas is fixed in the short run. Europe can replace the missing Russian gas only by bidding more than consumers elsewhere, especially in Asia, are willing to pay**
- **The supply of gas available for Europe is thus highly inelastic; therefore, the marginal cost is an order of magnitude higher than the price**
- **Consumers do not factor this externality in their decisions. They should be given extra incentives to save**
- **Individual countries will engage in insufficient gas-saving efforts because they do not take into account that their national gas savings will benefit all their partners through lower import prices**
- **EU policy should concentrate on ways to save gas, not on how consumers are protected from the current high prices**

THE HIGH COST OF NOT SAVING GAS

Increasing the production of gas takes time. Contrary to oil, there is no spare capacity in gas because it is technically difficult to reduce production from an existing field. However, for Europe, supply is not given, as it depends on the global price, which induces consumers elsewhere, especially in Asia, to use less gas.

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

One can thus define a supply curve at the EU level by Q=Q (p), with Q'>0. One must assume any additional gas for the EU would

Daniel Gros

is a distinguished fellow and Member of the Board at the Centre for European Policy Studies (CEPS), previously serving as director of CEPS for twenty years. Gros is also an advisor to the European Parliament.

come from imports (and, equivalently, any cubic meter not consumed in Europe reduces European import demand by one cubic meter).

What is then the marginal benefit from any additional quantity not consumed? It is the change in the gas import bill (= pQ) that arises because of a reduction in European demand, dQ. Formally, this is given by the following:

(1) Marginal cost of gas

$$= \frac{d(import\ bill)}{dQ} = \frac{d(pQ)}{dQ} = p + Q\frac{dp}{dQ} = p + Q\frac{pdp}{pdQ},$$

which can be written in terms of the elasticity of the gas supply abroad (for the EU), which is defined as

$$(2)\ \sigma \equiv \frac{dQ/Q}{dp/p}.$$

Using this elasticity, the marginal cost can be expressed more simply as

(3) Marginal cost of gas

$$= \frac{d(import\ bill)}{dQ} = p(1 + \sigma^{-1}).$$

A first immediate corollary is that 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 to be only 0.1 (but with the opposite sign).

The reason for this large difference between the price and the marginal cost is that higher import demand leads to a higher import price, which implies large terms of trade loss for Europe.

This simple consideration shows that the benefit from importing one less cubic meter of gas 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 (= elasticity of household demand abroad, i.e., the countries from which the additional LNG would have to be diverted from, like Japan or Korea) of only 0.1, the equation above would lead to the conclusion that the marginal cost of gas is 11(= 1+1/0.1) times higher than the price.

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.

An 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. If one denotes the share of overall EU gas consumption of any individual country by α, the marginal cost perceived reduces to the following:

(4) Marginal cost of gas to individual country

$$= \frac{d(import\ bill)}{dQ} = p(1 + \alpha\sigma^{-1}).$$

For a very small entity (a single firm or a small member country), α would be very small and the marginal cost of importing more gas would thus be close to the price. This explains why individual governments act as if their actions do not affect the import price of the EU. There is thus an external effect operating, whereby each individual government does not face a strong incentive to encourage gas savings at home.

This is why some EU member countries have announced the intention to give special subsidies to energy-intensive industries to allow them to continue production and why Spain has elected to subsidize the cost of gas for power generation. These policies impose enormous economic costs. The opposite should be done. Governments should offer energy-intensive industries subsidies to close down temporarily or at least diminish production, and these subsidies should be proportional to the gas saved in this way. However, individual countries do not follow this type of policies because they do not take into account the impact of their actions on the import price.

However, at the EU level there should be a strong interest in incentivizing gas savings and encouraging member states to follow this policy. Unfortunately, there is little the EU can do to force countries to change their policies. The “Save Gas for a Safe Winter” plan of the European Commission contains only a “voluntary” gas demand reduction target of 15 percent from 1 August 2022 to 31 March 2023.

A GAS SAVINGS SUBSIDY FOR HOUSEHOLDS

The high spot market prices for gas over the last months are now feeding through to higher prices for consumers.[1]

A regular survey of residential energy costs finds that, on average across the 27 EU capitals, household gas prices have roughly doubled since August 2021. This is an average; some countries (like France) have limited the price increase, whereas in others the price has risen to three times the status quo (average of previous years), but with new prices applying mostly only to consumers who switch suppliers. Many consumers still have old contracts at prices which are

[1] The Rotterdam TTF spot price is now around 200 euros per megawatt hour, but the average price paid by German imports is still below 100 euros.

not indexed on the market price and therefore have not increased by much.

Thus, the reality is that many consumers do not face even the market price and, as argued above, even for those who do face higher prices, the price does not reflect the marginal cost to the EU as a whole.

One way to increase the incentive for consumers to save on gas would be a "gas savings subsidy": the government should temporarily offer consumers a "subsidy" for any "reduction" in their use of gas (instead of subsidizing gas consumption). The aim would be to further increase the marginal benefit households (or firms) obtain from gas savings during the crucial coming heating season.

In concrete terms, the government could offer households the following scheme: households pay the market price for the gas they consume. But the government provides them with a payment equal to x euros per cubic meter (or kWh) of gas that is saved during the winter of 2022/3 compared to the previous heating period (e.g., October to March 2021/2).[2]

This would mean that for households the marginal gain from reducing gas consumption below the benchmark of last year would be even higher than the price they pay. The benefit for consumers of each cubic meter saved would equal to the sum of the price and the subsidy, increasing the incentive to save.

THE COST FOR PUBLIC FINANCES

The cost for public finances would of course depend on the take-up of the scheme. Here, we provide a simple simulation for Germany, assuming a strong reaction by consumers.

The starting point is that German households consume a bit less than 300 billion kWh in gas per calendar year (most of which over the winter season).[3] If households reduce their gas consumption by 20 percent (relative to 2021/22), the cost to the government would be 60 billion kWh times the subsidy. This savings is possible since a subsidy rate of 12 cents per kWh would amount to 50 percent of the price and can thus be expected to have a significant impact on demand. 12 cents per kWh would lead to a total cost of EUR 7.2 billion (at the country level in Germany) if consumption falls by one-fifth. If households react even more strongly, i.e., if consumption falls by 30 percent, the government would pay households more in subsidies, but the cost would still be moderate, at about EUR 11 billion.

The cost of subsidizing a reduction in gas consumption would thus amount only to a fraction of the overall cost to German public finances of the latest "Doppel Wumms" package, under which the German government put aside EUR 200 billion to ameliorate the burden of high gas prices.

POLICY CONCLUSION

With Russian gas no longer available to Europe, gas has become a very scarce and very expensive resource. Many governments are providing support to households and industry to mitigate the impact of higher energy prices, implicitly subsidizing the use of gas. The opposite approach is needed: scarce public resources should be used to reinforce the incentive to save on gas. If governments pay people to use less gas, prices do not need to go much higher to reduce gas consumption. A gas savings subsidy thus offers a way to satisfy voters (at least partially) without sacrificing economic efficiency.

The gas savings subsidy scheme proposed could make a substantial contribution to lowering household gas demand during the next, absolutely critical, heating season. If extended to large users, it could also change the marginal cost of using gas for industry, without eating into their profits. The fiscal cost should be moderate because the cost of the savings subsidies arises only at the margin (via the amounts saved) instead of the whole amount, as in the case of a general price cap or subsidy.

If a gas savings subsidy could be applied across the EU, it could also lead to lower gas prices, thus lessening the terms-of-trade loss that the current high prices impose on Europe. The fiscal cost of the subsidy would hence implicitly be borne by gas suppliers.

[2] This would thus remain an exceptional measure, limited to the 2022/3 heating season, because of the exceptional circumstances created by the war in Ukraine. However, the subsidy scheme proposed here should have also some beneficial longer-term effects even if offered only during one heating season, because it induces consumers to find ways to use less gas, which they might not have considered beforehand. Habit formation can have a longer lasting impact on demand.

[3] Over the year, household demand accounts for between 40 percent and 50 percent of all gas use (including the gas employed in power generation), but during the heating season households constitute the bulk of demand. Incentivizing energy-intensive industries to save on gas (maybe by switching fuel, or by reducing production) remains important, but measures to reduce residential demand become more important during the winter. A recent publication by Agora Energiewende provides some basic data and calculations of the potential savings up to 2024 (Baumeister et al. 2022).

REFERENCES

Baumeister H., F. Heilmann, A. Langenheld, T. Lenck, J. Metz, S. Müller, F. Peter, B. Saerbeck and J. Steitz (2022), *Energiesicherheit und Klimaschutz vereinen – Maßnahmen für den Weg aus der fossilen Energiekrise*, Agora Energiewende, https://static.agora-energiewende.de/fileadmin/Projekte/2022/2022_03_DE_Immediate_Action_Programme/A-EW_252_DE_Immediate_Programme_WEB.pdf.