



The Storage market in transition – What needs to be done?

1) Introduction

Storage facilities provide value to gas customers in four key ways:

- o Seasonality – storing gas in summer (lower demand periods) and withdrawing gas in winter (higher demand periods).
- o Flexibility – supporting day to day and week to week variations in gas demand away from the average demand that might be expected.
- o Insurance value – avoiding risks to security of supply and extreme prices driven by factors such as weather, asset failures, and political events.
- o System value – reducing the need for extra-large networks, particularly to deliver gas behind pipeline bottlenecks, and aiding pressure and congestion management.

Originally, gas storage was built as an integral part of the supply infrastructure. It was part of vertically integrated company that could take advantage of its contribution to the gas network by providing regional availability of peak supplies, thus significantly reducing the requirement for transmission capacity and even the upstream markets. Investments backed by medium to long-term contracts also helped to underwrite its construction.

This meant that all four values provided by gas storage has formed an integrated part of the supply infrastructure and thereby to the gas market.

But with the liberalization of gas market, the use of gas storage activities has been deeply altered.

The EC's Third Energy Package has led to the unbundling of regulated network activities from competitive wholesale and retail activities, and gas storage has also typically been unbundled from network activities. Adding to that, and with the development of trading hubs, the liberalization process has also tended to see gas storage much more as a participant in the energy market than an efficient piece of supply infrastructure and a strategic asset.

Therefore, gas storage now competes with other sources of flexibility in an increasingly competitive environment, leading to a summer-winter price spread which is so low that most SSOs do not cover their cost anymore.

In fact, SSOs are not remunerated for the system and the insurance values that they provide to the market as so far, these externalities are not internalised within the market price.

Following the Madrid Forum where gas storage issues have been the subject of intense discussion, GSE would like to thank the EC and all the stakeholders for their interest. In order to go a step further and conduct a sound analysis, all the work will be backed by technical expertise, case studies and economic justification, in strong collaboration with the main stakeholders involved.

To achieve this outcome, this paper will explain why the insurance and system value have become positive externalities not remunerated by the market and what consequences this may lead to. Then, we will also try to give indication on how we intend to move forward.



2) Are positive externalities of gas storage remunerated by the market¹?

The market value of gas storage is to a large extent determined by the summer-winter spread of gas prices, and the volatility of day to day prices. In the last ten years, as increasing levels of flexibility have come to the market, European price spreads have reduced significantly (see Figure 1).

Figure 1 – TTF summer-winter spreads



Source: Pöyry Analysis of ICIS Heren data. Chart shows daily price spread between the next summer product and the following winter product, determined from closing prices at TTF. The drop in the spread over the last ten years directly feeds into a change in the market value of gas storage.

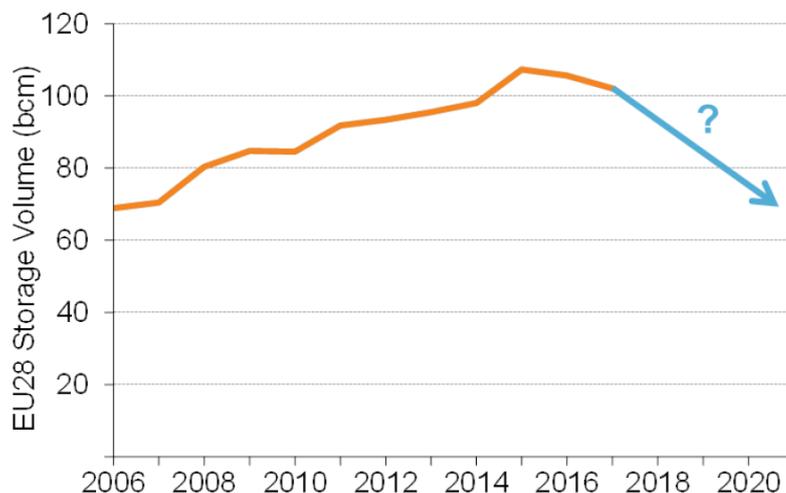
The current, historically low level of spreads and volatility mean that merchant revenues for storage facilities are too low for many storage facilities to cover ongoing capital investment, and some facilities cannot recover their fixed costs. As legacy contracts expire, more facilities are being placed into this position.

This will drive a significant reduction in storage volumes, reversing the trend of increasing volumes built on the back of higher spreads before 2010. It is not clear how much storage will close, but independent estimate suggest that it could be 20-30 bcm of the 100bcm of storage capacity in Europe (see Figure 2), returning us to the levels last seen a decade ago. More importantly, it is also not clear which storage will close and whether it would be critical to the networks and security of supply.

¹ Pöyry: "GAS STORAGE MARKET FAILURES", A report to Gas Infrastructure Europe, September 2017



Figure 2 – Evolution of European storage volumes



Source: Analysis of IEA and GIE data 2006-2016, and Pöyry analysis for 2017, for EU28. The blue line indicates that more storage is likely to close, relative to 2017 levels, but the volume and rate of closures are not yet known.

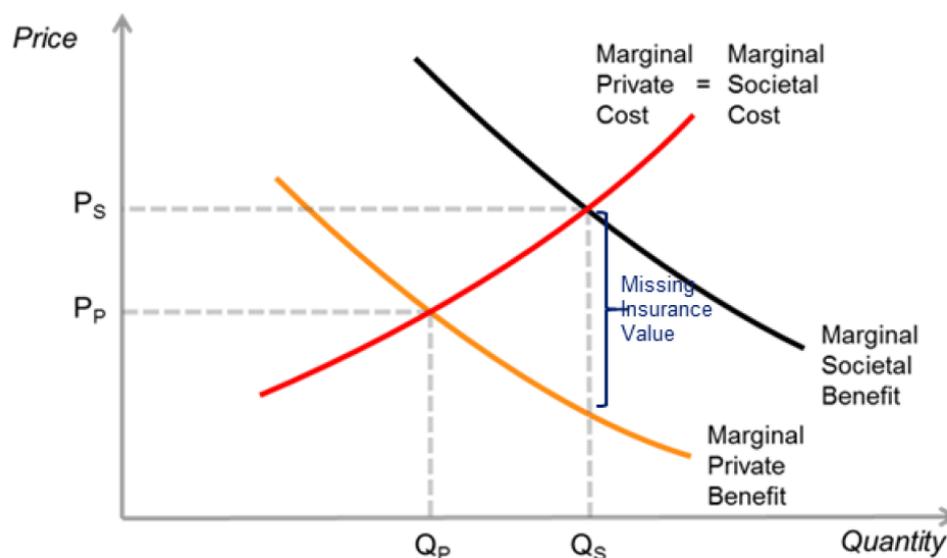
Current market arrangements allow gas storage to be paid for the value of the seasonality and flexibility that they provide.

However, because shippers are insulated from the full costs of loss of supply, storage companies in merchant markets do not receive the full social value of the insurance that they provide (see Figure 3), and are not paid for the system value that they bring. The market failures in insurance are analogous to those identified in the European Commission's Sector Inquiry into electricity, where subsequent recommendations have led to interventions to adjust the price signal to reflect the full value brought to the system.

These market failures mean that storage is not exposed to the full value it brings to the gas system – that is, externalities are missing from the market price.



Figure 3 – Illustrative example of positive externalities of gas storage



P_P and Q_P show the price and quantity for private equilibrium, while P_S and Q_S shows the price and quantity for societal equilibrium. The consequence of an externality – that is, the price is missing part of the value of gas storage – is that more storage will close than is in society's best interest, and social welfare will be lost.

While storage closures will lead to a recovery in market spreads, under current arrangements the market price will continue to exclude part of the value of storage. This missing externality means that it is likely that too much storage will close, and close in the wrong locations, compared to an efficient market. In the absence of quantitative assessment of these market failures across Europe, it is possible to identify this problem, but we not yet know how large – or where – the negative impacts will be. However, the long term consequence of this will be a reduction in EU welfare, and it may lower the security of gas supply in Europe.

Conclusions and recommendations from a study done by Poyry

The current situation, whereby storage companies can only capture part of the value they bring to the system, will result in the closure of too much storage and will have a long term negative cost to society.

Poyry recommends that the system value and full insurance value of storage need to be assessed, and where they are material, intervention should be taken to correct the price signals that are seen by storage.

Not doing this could result in the closure of too much storage in merchant markets, and there is a danger that the security of supply and network operations may be put at risk.

3) What needs to be done ?

An efficient balance between transmission and storage shall ensure the optimal level of gas storage capacity in the future gas market design



At the Madrid Forum, it has been stressed that the focus shall be on implementing cost-efficient measures, considering the value of the existing gas infrastructure, to the benefit of EU energy consumers

The potential concerns in certain markets whether regulatory measures are needed to ensure sufficient gas is available in storages has been discussed. Finally, there is now a call for a sound analysis and with the consultation of the gas industry before considering measures in order to avoid distortion to market functioning.

GIE welcomes this decision as it allows all the stakeholders who are involved in that field to continue to provide additional inputs and to go even further in this approach, to establish new goals and measures to the benefit of the society.

GIE wants to emphasize that an integrated strategy shall be adopted where all the value drivers of gas storage are remunerated appropriately. Indeed, it is important to achieve a successful transition to gas as a competitive fuel source based on a resilient gas system and capable of turning environmental considerations into success.

Even without Quo Vadis, this matter will be a cross-border issue tomorrow where flow patterns are likely to change. With the further decline in domestic gas production and the development of LNG imports, the average transportation distance is likely to increase, which put into question the key role that gas storage can play to support transmission.

Moreover, internal gas flows across Europe have the potential to become much more variable, given the potential increased volatility in demand driven by intermittency of renewables on the electricity system. The broadening range of import options available at its boundaries will also mean that trade gas will be transported over longer distances and won't offset the swing of declining gas production.

A strong and resilient European gas market is more than ever needed in a market where the tensions will be rampant between the different regions of the World. In a mature gas market such as Europe's, regular, low-cost incremental investment in new capacity at existing facilities is the most efficient way to satisfy demand. An efficient balance between transmission and storage shall ensure the optimal level of this system stability and the level of security supply in the future gas market design.

Finally, Quo Vadis will imply the need to manage system flows in response to different entry nominations. Part of the storage operation can potentially become a part of managing transportation constraints. The long-term societal benefits of gas storage as efficient pieces of infrastructure and as strategic assets cannot be ignored.

Storage volumes across Europe are already falling, and urgent action is needed to ensure that too much storage does not close – once the storage has closed, the opportunity to intervene will be lost, as the costs of rebuilding storage are large and takes several years. To date, studies into the European gas system have rarely considered the consequences of having externalities on the storage market, and without doing so, their conclusions may be misleading. With Quo Vadis study ongoing, there is a current opportunity to consider and address these gas storage market failures within the EU.