



# GAS STORAGE MARKET FAILURES

## REPORT SUMMARY

September, 2017



# DECLINING SPREADS WILL LEAD TO STORAGE CLOSING

Many gas storage operators cannot afford to stay open, and market failures mean that the market may lead to a sub-optimal level of storage capacity in Europe

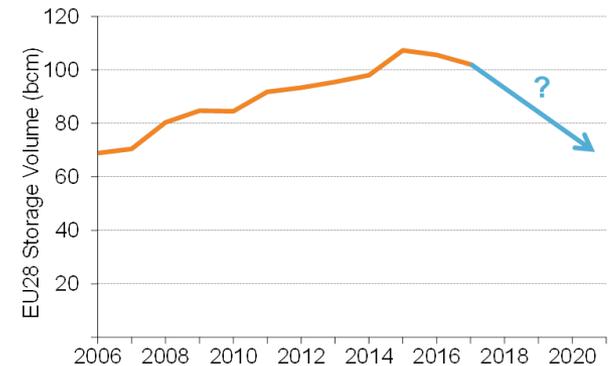
- The market value of gas storage is to a large extent determined by the summer-winter spread of gas prices, and volatility.
- In the last ten years, as increasing levels of flexibility have come to the market, price spreads have reduced significantly (see Figure 1).
- Current spreads and volatility mean merchant revenues are too low for many storage facilities to cover ongoing capital investment, and some facilities cannot recover their fixed costs.
- This will drive a significant reduction in storage volumes.
- It is not clear how much storage will close (independent estimates suggest 20-30 bcm more storage could close – see Figure 2) or whether it will be the required type of storage or in the right location.
- The merchant gas storage price does not reflect the full value of gas storage, as market failures mean that externalities are missing from the market price (see page 3).
- There is concern that these market failures mean too much storage will close because **a market price spread recovery will not incorporate the full value of storage.**
- This may endanger security of supply and/or require expensive future interventions to rebuild storage.
- Consequently, decommissioning decisions are likely to be inefficient and could increase costs and risks for consumers in the longer-term because too much flexible capacity may close, or may close in the wrong location.

Figure 1 – TTF summer-winter spreads



Source: ICIS Heren data. Chart shows daily price spreads for the next summer product and the following winter.

Figure 2 – European storage volume evolution



Source: Analysis of IEA and GIE data 2006-2016. Pöyry analysis for 2017.

# GAS MARKETS DO NOT PRICE IN THE FULL STORAGE VALUE

Within current arrangements, gas storage cannot realise the full value it provides to the gas system

Arbitrage Value

## Seasonality



- Temporal arbitrage between summer and winter.
- Value is visible as seasonal price spreads in well functioning markets.
- These are only 'reliable' for liquid North-West Europe markets and hubs that take them as references.
- **Valid in liberalised markets**

## Flexibility



- Temporal arbitrage in balancing variable supply and demand across days or weeks.
- Value is visible as volatility.
- Options & derivatives provide confidence limits on future pricing, but much of the actual volatility relates to underlying fundamentals, e.g. reliability of assets, unpredictability of weather, etc.
- **Valid in liberalised markets**

## System



- Increases network capacity at key bottlenecks and aids pressure and congestion management.
- No EU legislation transfers the full system value to SSOs.
- Some local practices (OBAs, load flow commitments) may transfer some value in some cases.

**FAILED**

## Insurance



- Avoidance of risks to security of supply and extreme prices driven by weather, failures or politics.
- Governments and consumers usually require a higher level of insurance than the buyers of the service.
- Security of supply obligations and strategic storage are sometimes used to address the physical need, but don't always recompense the SSO appropriately.

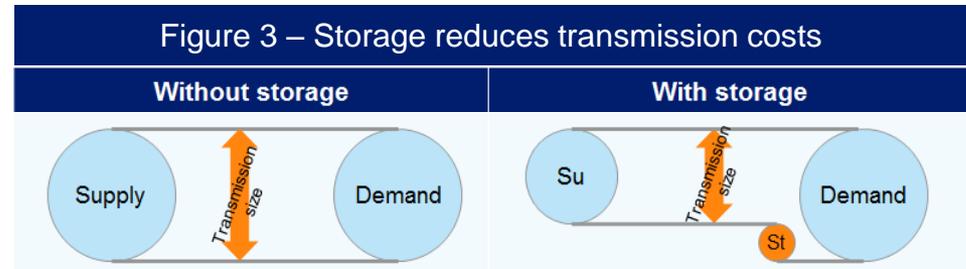
**FAILED**



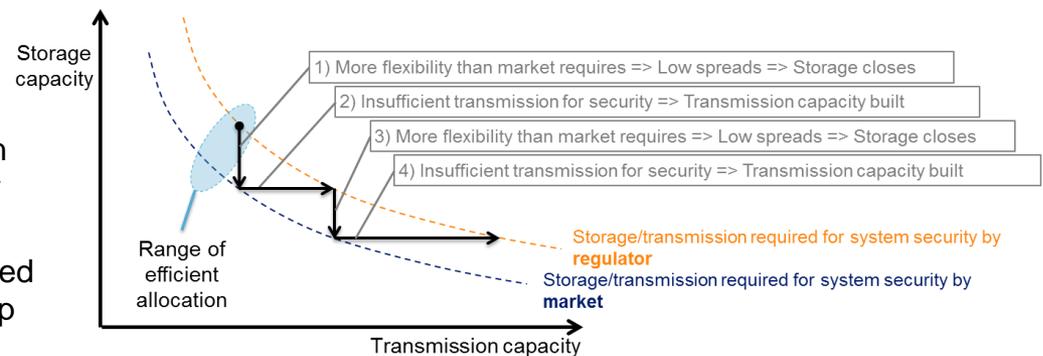
# THE MARKET FAILURE REGARDING SYSTEM VALUE

## Storage is not paid for the system value it provides, and suffers crowding out from competition with transmission under a regulated asset base

- Storage provides a system benefit by ensuring regional availability of peak supplies, thus significantly reducing the requirement for transmission capacity, both in the same and upstream member states (see Figure 3).
- This was generally recognised under integrated planning and network development, but separation/unbundling has meant that storage is not rewarded for reducing the network size, and hence, cost of the transmission system.
- Storage also competes with transmission for provision of flexibility and security (see Figure 4). Where transmission operators are not incentivised to consider storage (or non-network capacity) solutions in their network options assessment, then an inefficient balance may emerge.
- Efficient storage investment/divestment decisions should incorporate the full value they bring to the system.
- These considerations will become even more important with an expected increase in demand volatility driven by the intermittency of renewable sources of electricity.
- The system value of storage is not considered in most gas market modelling, e.g. Follow-up study to the LNG and Storage Strategy



**Figure 4 – Storage competes with transmission investment**



Note: diagram considers case where merchant storage co-exists with regulated TSO, and TSO does not consider supporting storage within network planning.

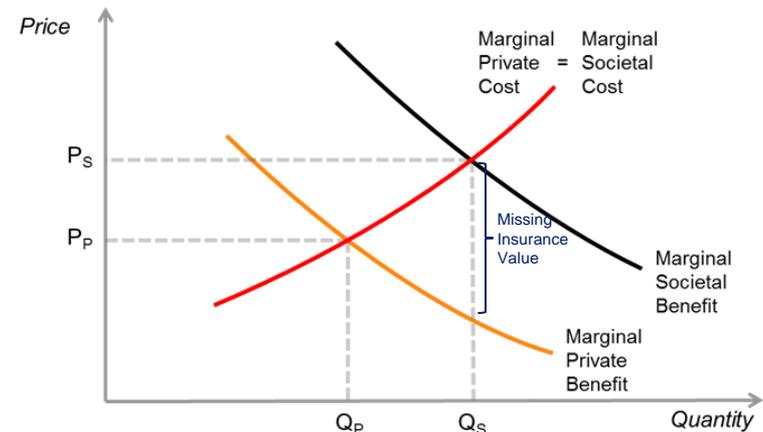


# THE MARKET FAILURE REGARDING INSURANCE VALUE

## Merchant storage is not able to capture a market price that reflects the true insurance value it provides

- Shippers book storage as an option to use in case of extremely high demand or loss of supply (low probability, high impact events).
- The benefit to society is the avoidance of the value of lost load (VOLL)
- Shippers are not exposed to the full costs of tight systems, typically facing costs well below VOLL, because imbalance prices may be capped at times of system stress. Thus shippers have a benefit (i.e. avoided cost) much lower than that of society.
- In the absence of national obligations, shippers are incentivised to procure sufficient insurance to cover their own costs, but not the full societal costs. Hence the price signals reflect only part of the insurance value of storage.
- Individual market participants have a short-term focus and are not incentivised to insure against rare events that would significantly impact the European economy.
- This failure will result in an inefficient volume of storage, i.e. too much storage is likely to close, and security of supply would be lower than socially desirable.
- National obligations provide additional security where they are applied, but will not provide an efficient volume or regional allocation of storage across the EU, unless applied in a harmonised manner.
- Similar features in the electricity sector led to the introduction of capacity markets to ensure security of supply.

Figure 5: Illustration of positive externalities



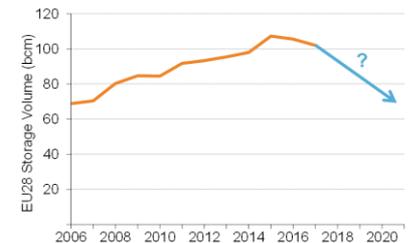
$P_p$  = Price for private equilibrium  
 $P_s$  = Price for societal equilibrium  
 $Q_p$  = Quantity for private equilibrium  
 $Q_s$  = Quantity for societal equilibrium

- Society puts a greater value on the benefit of storage (MSB) than the shippers (MPC), so left to its own devices the market would require less storage ( $Q_p$ ) than society would want ( $Q_s$ ).
- Assuming interventions, such as storage obligations, define the quantity of storage needed by society ( $Q_s$ ), the market price would be much lower than the price society would be prepared to pay ( $P_s$ ) for the security of supply.
- The difference is the missing value of insurance.

# KEY CONCLUSIONS

## Storage facilities are likely to close and if the potential market failures are not assessed it is likely that *too much or wrong* storage will close

- Merchant storage can only capture arbitrage value and part of the insurance value under current market conditions.
- The revenue received from the arbitrage value, based on spreads and volatility, is not sufficient to keep most facilities open in the long term – some facilities have closed in the last year and many more are looking to do so.
- The system value and full insurance value need to be considered, and, where material, regulatory intervention needs to be taken to correct the price signals seen by storage.
- Not doing this could result in the closure of too much storage, and there is a danger that long-term security of supply and network support will be put at risk.
- Urgent interventions may be needed to address the market failures in system and insurance value (if material) to ensure too much does not close.
- The market failures in insurance are analogous to those identified in the Commission's Sector Inquiry in electricity.
- Quo Vadis and the Follow-up study to the LNG and Storage Strategy provide an opportunity for addressing the missing price signals for storage, particularly as storage is a long-term investment, but do not take the full value of storage into account. This leads to a risk that their conclusions are misleading.
- There is a real risk that current opportunities may be missed, as a result of strategies not considering the full value of storage, and interventions taking place too late after storage has been closed.





Andrew Morris  
[andrew.morris@poyry.com](mailto:andrew.morris@poyry.com)  
+44 (0)1865 812212

GIE  
[gie@gie.eu](mailto:gie@gie.eu)

Bradley Steel  
[bradley.steel@poyry.com](mailto:bradley.steel@poyry.com)  
+44 (0)1865 812881

Gareth Davies  
[gareth.davies@poyry.com](mailto:gareth.davies@poyry.com)  
+44 (0)1865 812204

Angus Paxton  
[angus.paxton@poyry.com](mailto:angus.paxton@poyry.com)  
+44 (0)1865 812263

*Consulting. Engineering. Projects. Operations.*

[www.poyry.com](http://www.poyry.com)