



Gas Storage Europe

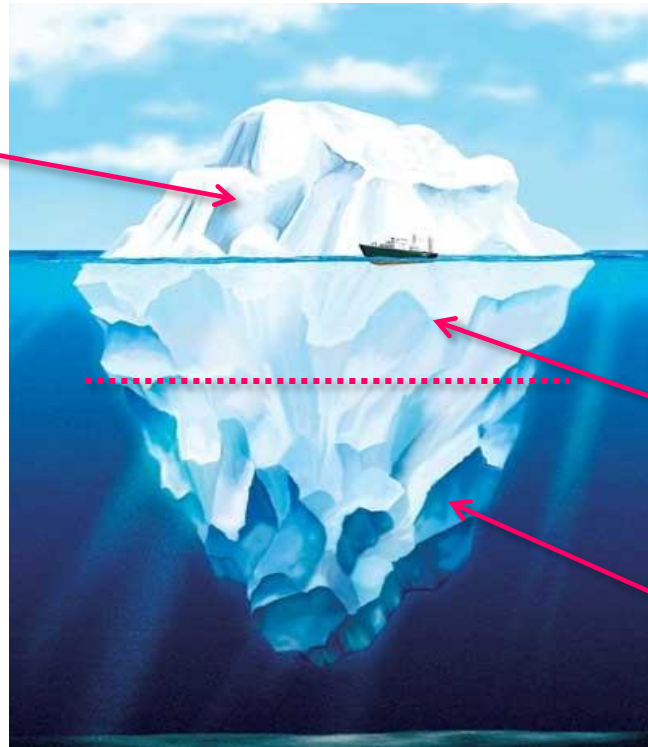
Gas Storage Value

The Value of Storage is like an iceberg ...

THE VISIBLE

Market values

- Intrinsic
- Extrinsic

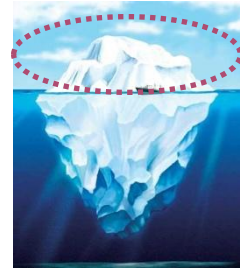


THE INVISIBLE

System value

Insurance value

...with the greater part remaining invisible



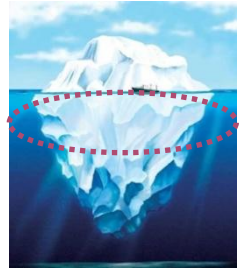
“Market values” of Storage

Intrinsic Value

- Based on difference between gas price in summer (injection) and winter (withdrawal).
- Reflects seasonal demand pattern.
- “Static view” of the seasonal forward curve.

Extrinsic value

- Based on shorter-term price differentials : day-ahead, weekend, month ahead etc.
- Dynamic and complex function of price volatility, asset flexibility, optimization strategies.
- Potentially high value from small price variations but limited price visibility.



“System value” of Storage

- Avoided investment in wells and surface facilities (up to 80% of avoided CAPEX).
- Optimized operations and maintenance (plateau vs. swing).
- Maximization of gas production (up to 15% of volume).

Optimized gas production

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- Avoided investment thanks to lower peak load requirement (avoided CAPEX of 9%-16%*).
 - Reduced operating and maintenance costs thanks to optimized gas compression.
 - Reduction of local bottlenecks.

Cost-efficient gas transport

Storage is 5-7 times less expensive than the extraction of the corresponding reserve and construction of transmission facilities (source : Gazprom)

* source: Pöyry



“Insurance value” of Storage

Hedge against supply risk

- Timely response to demand at all times: prolonged periods of high demand, cold peaks; back-up for renewables integration etc.
- Safeguard against unexpected high impact events: technical failures (production, pipeline), geopolitical risk.
- Lesser vulnerability and higher bargaining power in politically sensitive situations.
- Avoidance of high social welfare costs.

Some examples:

- ⇒ 2009 Russia-Ukraine dispute: storage and reverse flows were the main mitigating measures.
- ⇒ 2012 cold snap: storage was key in covering high demand (up to 55% daily demand coverage)
- ⇒ 2013 prolonged winter end: prolonged draw-down and cross-border use of storage.

Price signal for storage impacted by a mix of factors

Macro-economic factors

- Impact of US shale gas: coal displacing gas in EU
- Economic crisis in EU: lower gas demand

Impact of policy decisions

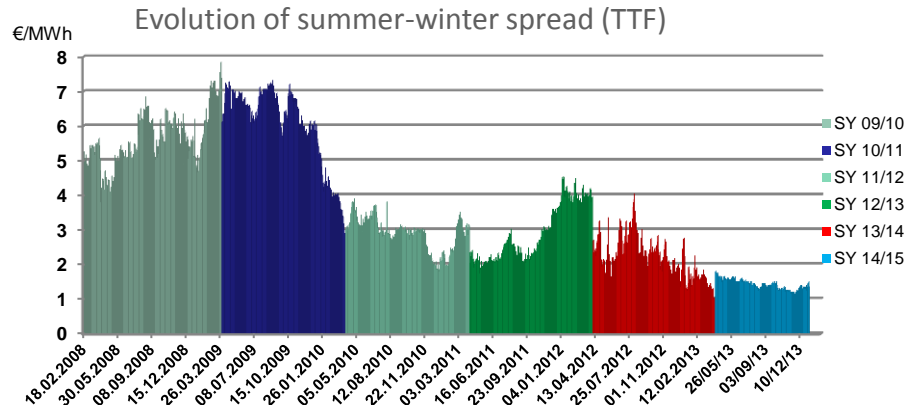
- Energy mix (RES, nuclear etc)
- Design of CO₂ market

Emergence of EU flexibility market

- Development of wholesale markets
- Development of interconnections
- Hub indexation of upstream flexibility



Seasonal price spread at historical lows discouraging users from contracting storage



Seasonal spread reflects “market sentiment”...

Seasonal spread offers merely a *forecast* of gas price differential between summer and winter

Unable to predict exceptional events

exceptional weather conditions, geopolitical events, technical failures etc. can suddenly alter supply / demand balance

May be a vicious cycle

increased withdrawals at winter end may increase summer prices narrowing further seasonal price differential

Ignores short-term value extraction

small short-term price spreads may allow to harvest significant value, but price development visibility is lesser

Disregards system efficiency

reduced peak-load and optimised use of gas network allow cost savings

Reflects only part of the market

futures contracts are only a small part of gas demand; bulk of physical supply to EU is based on long-term contracts

...not the actual value of storage

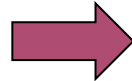
Low spreads may ultimately lead to facility closures

- If low spreads persist, SSOs may be unable to cover their costs.
- Possible options :

Mothballing ?

Both require financial outlays...

Decommissioning ?



...only decommissioning could generate some cash (by sale of recoverable cushion gas) but destroys value

- Decommissioned capacity may be missing in the future when demand picks up :
 - increasing import dependency
 - development of new technologies : power-to-gas...
 - growth of renewables requiring gas back-up
- New storage would need to be built but it takes 5-8 years to construct storage, while only 2-3 years to build a CCGT.

...which is irreversible, costly and short-sighted

Storage operators are adapting to new circumstances

- Storage operators pursue commercial and operational innovation to :
 - respond to the ever more specific market needs
 - optimize and preserve assets
 - provide support to efficient network operations



- However, the ability of storage operators to "innovate themselves out" of low price signals is limited:
 - storage is a long term and capital intensive activity with 20-25 year pay-back period : alignment to current low price spreads is not sustainable in the long-term.
 - storage requires management of complex geological and operational constraints.

Regulatory framework should also adapt

- **Regulatory framework should be conducive to commercial innovation by storage operators.**
- **Transmission fees that avoid cross-subsidies and reflect storage benefits for end-users.**
 - storage users should not pay twice
 - fees that reflect avoided investment and operating costs, increased system stability...
- **Non-discrimination between network users: unrestrained access to/from storage at storage-transmission interface (firm capacity).**
- **Non-discriminatory rules for storage users in system emergency situations.**



Gas Storage Europe

GIE is proud to support

The 'Gas Naturally' logo consists of the word 'gas' in a large, blue, sans-serif font, with a stylized blue flame icon above the 's'. Below 'gas' is the word 'naturally' in a smaller, green, sans-serif font. Underneath the entire logo is the tagline 'making a clean future real' in a small, dark blue, sans-serif font.

gas
naturally
making a clean future real

Gas Naturally

GN is a campaign to showcase the essential role of natural gas in the forthcoming energy revolution. The mitigation of climate change has become one of the most important issues for the gas industry.

Thank you for your attention

