



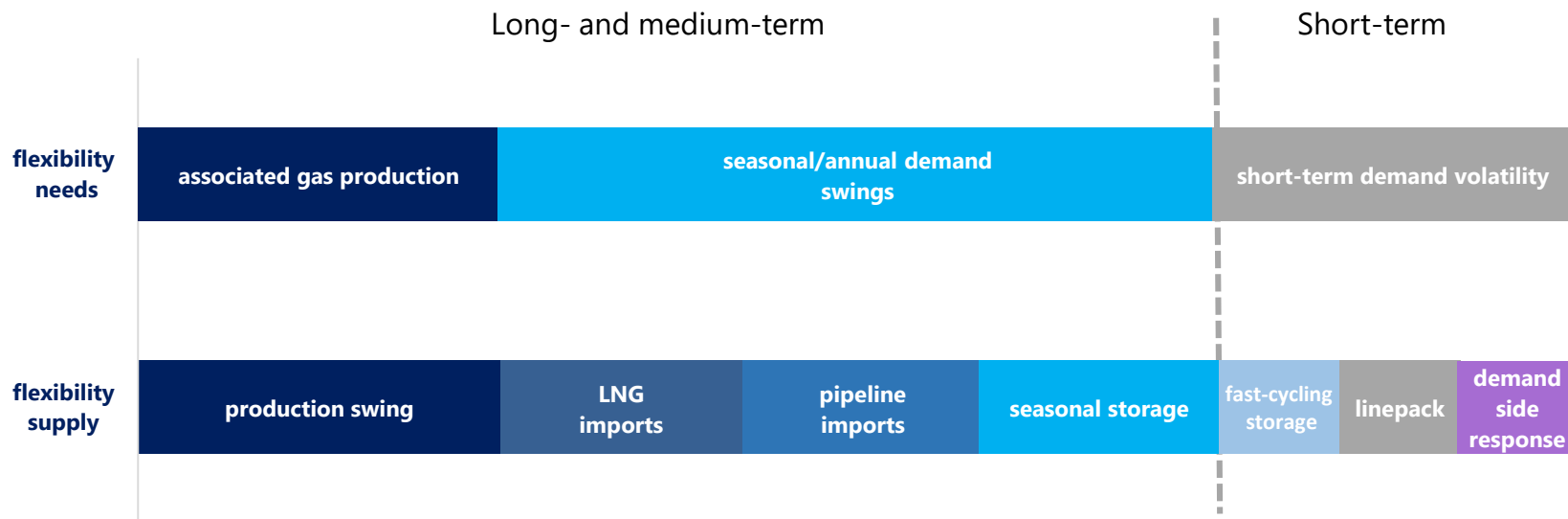
Natural gas storage: value and valuation

Gergely MOLNAR, Gas Analyst

Brasília, 23 October 2019, IEA Brazil Gas Workshop 2019

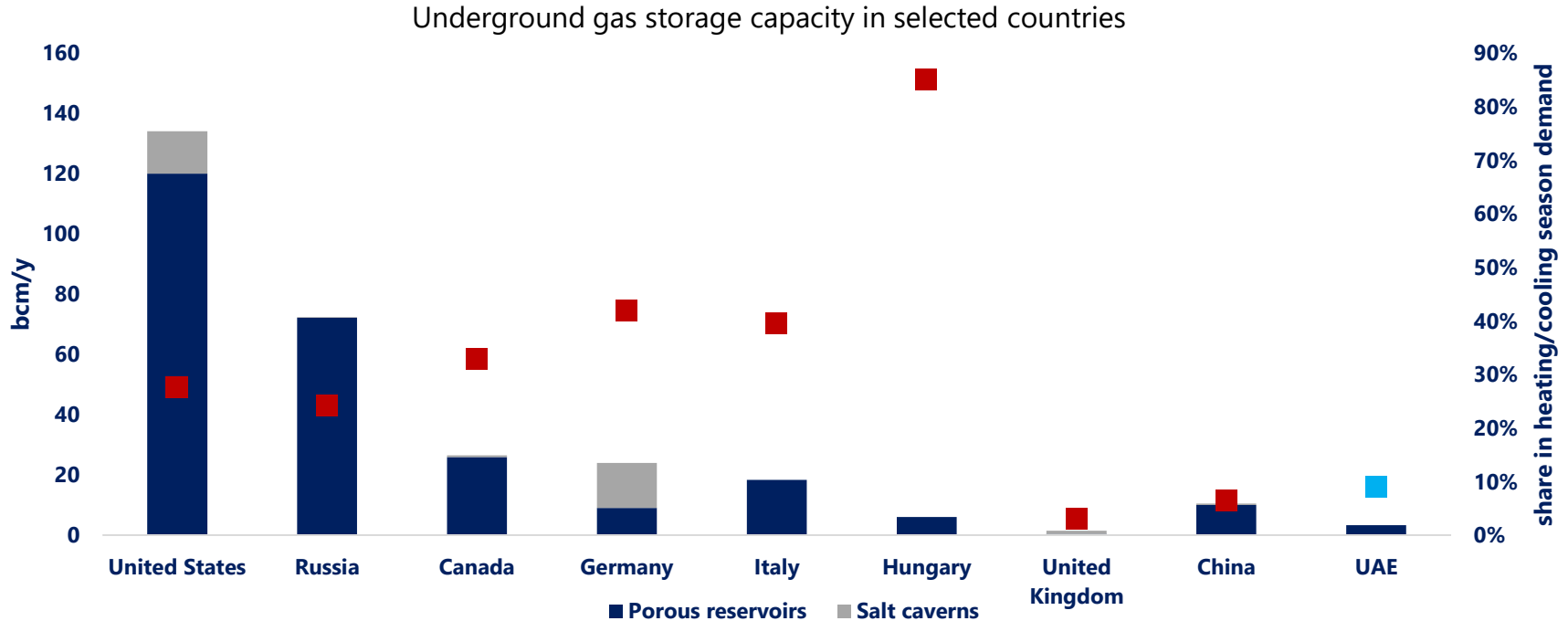
Each natural gas system has different flexibility requirements...

Simplified scheme of gas flexibility needs and supply



The flexibility requirements of the natural gas system can be matched with a range of tools providing both long- and short-term flexibility supply alongside the entire value chain.

...and a different endowment in gas storage capacity



Underground gas storage can be an important part of flexibility supply especially in countries with strong seasonal gas demand and/or high dependency on natural gas imports.

In a liberalised gas market...

- **Unbundling:** storage system operators are **legally and commercially independent** from other entities not relating to gas storage
- **Third-party access** to natural gas storage products and capacity allocation is guaranteed in a **non-discriminatory, objective** and **transparent** manner
- **Tariffs** and the methodologies underlying their calculation, are applicable in a **transparent** and **non-discriminatory** manner
- **UIOLI principle:** unused storage capacity is offered on the secondary market **to avoid contractual congestion**
- **Exemptions** can be granted **to new storage facilities** under the conditions that it is necessary to make the investment economically viable and it does not distort market competition

Value of natural gas storage

Market-based value

Seasonal price spreads

Intrinsic

Short-term price volatility

Extrinsic

Systemic value

Optimal gas system development

Network

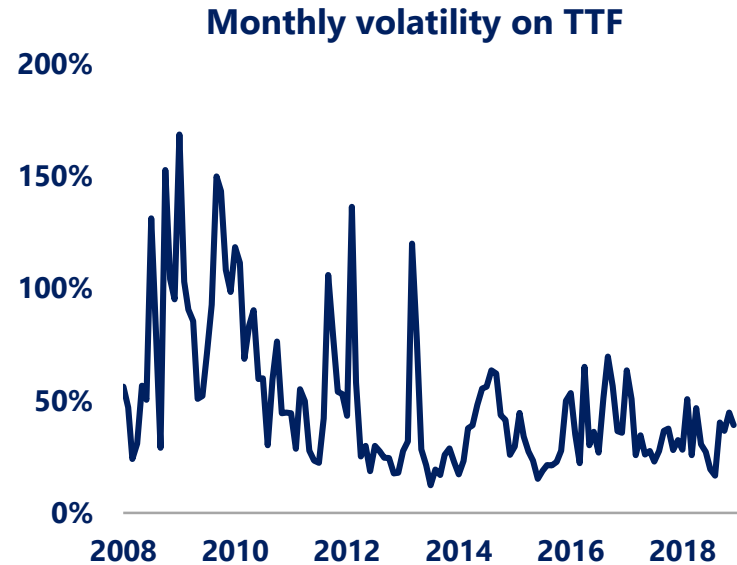
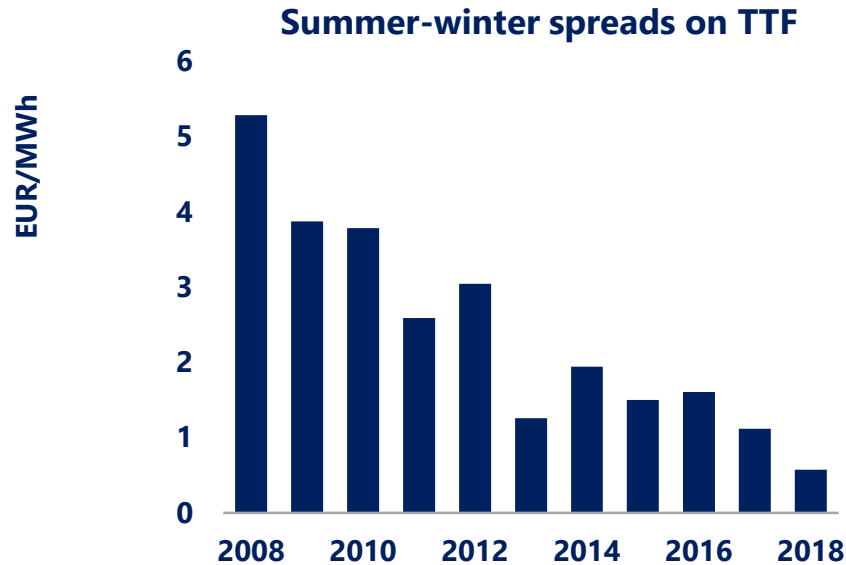
Supply obligations and security

Security

The value of natural gas storage derives both from seasonal and short-term arbitrage and the systemic benefits storage brings to the market in terms of grid development and security of supply.

Market-based value of natural gas storage

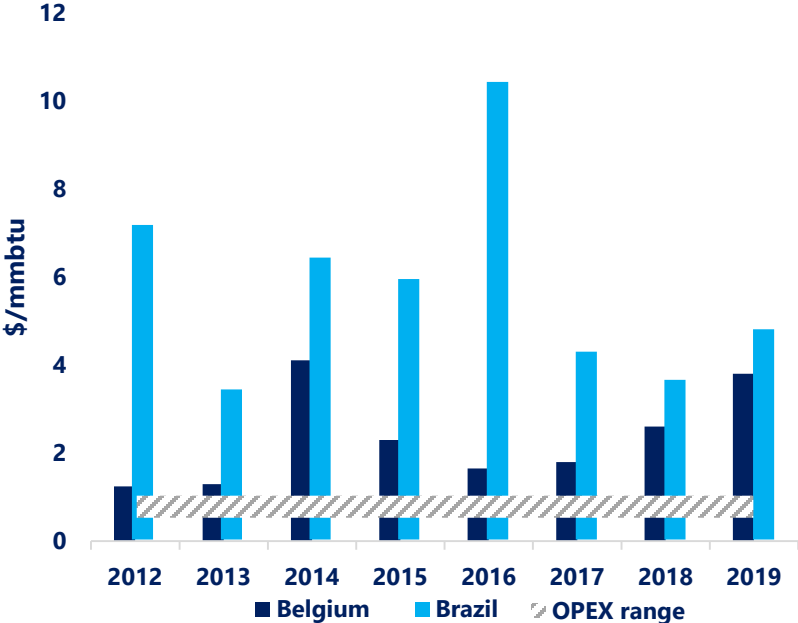
Summer-winter spreads and volatility on TTF (2008-18)



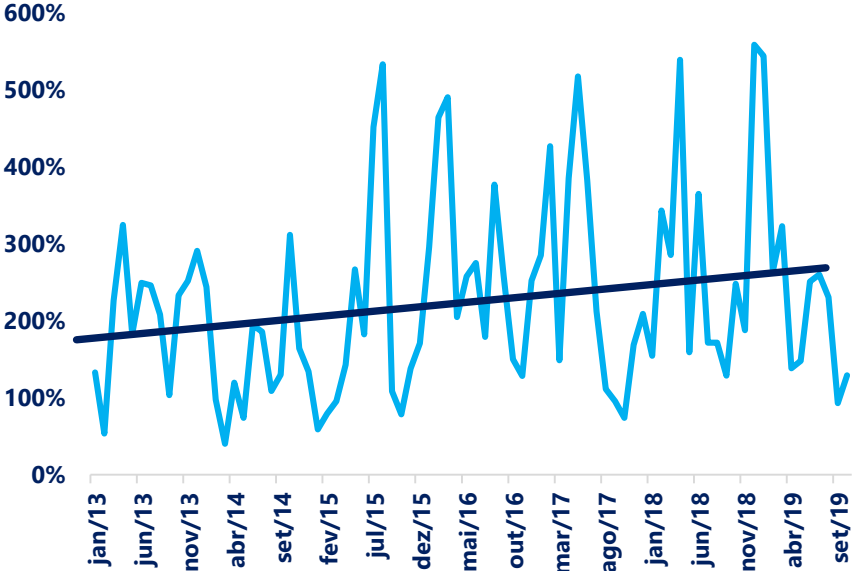
Seasonal spreads and short-term volatility of natural gas prices are the main value drivers for natural gas storage valuation in liberalized gas markets.

Potential market-based value of natural gas storage for Brazil

LNG import price variability (2012-19)



Volatility of gas-fired power generation (2013-19)



Storage could allow optimization of LNG imports in a context of high price variability, whilst increasing volatility of gas-fired power generation could benefit the extrinsic value of storage.

Commercialization of storage products

Physical products



Bundling

Bundled and/or unbundled

Basis

Point or pooled storage

Delivery

Firm or interruptible delivery

Duration

Multi-year, annual and short-term

Commercial offerings

Commercialization

Long-term storage contracts

- Multi-year contracts;
- Fixed/adjustable tariffs;
- Midstream suppliers;
- Long-term supply commitments.

Auctions

- Regulated tariffs;
- Annual/monthly;
- Bidding process;
- Midstream suppliers;
- Seasonal spreads.

Remaining capacity

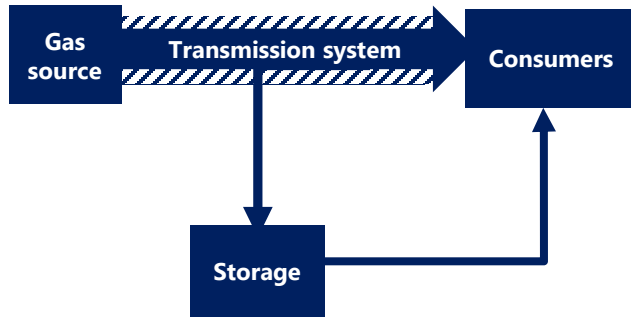
- UIOLI principle;
- Booking platforms;
- Short-term products;
- Traders;
- Volatility.

In liberalized gas markets, the revenue streams of storage system operators depend primarily on how market participants value the commercial offerings of storage products.

Systemic value of natural gas storage

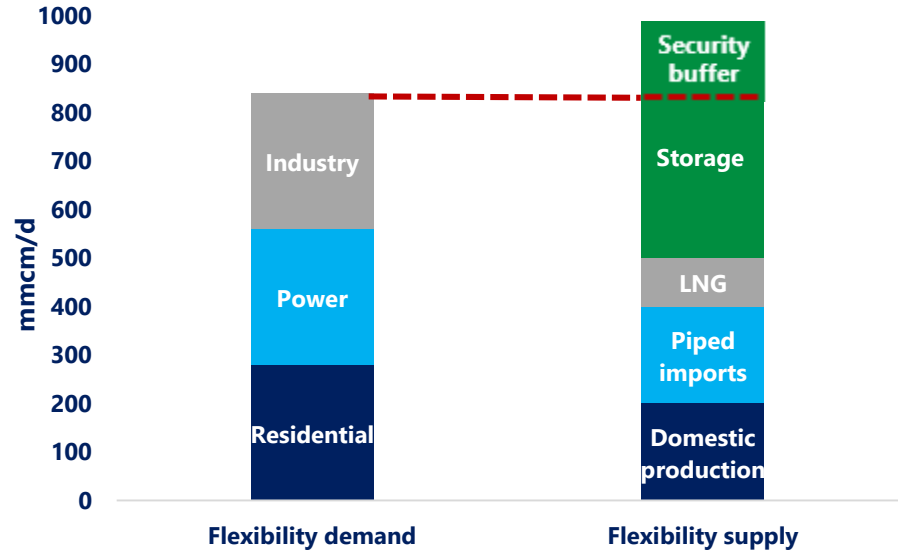
Network value

Gas storage allows a more optimal development and functioning of the gas grid



The European gas system would have a ~15% higher CAPEX without gas storage

Security value



The systemic value of natural gas storage derives from its contribution to a more optimal network development and a more secure gas deliverability.

Regulatory recognition of the systemic value of gas storage

Revenue reconciliation:

storage operators receive additional revenues if the difference between market revenue and regulated income of the gas storage operators are negative

Storage obligations:

market participants are required by the regulatory agency to hold a certain percentage of their annual natural gas supplies in storage, guaranteeing a more steady revenue for storage operators

Strategic storage:

storage operators dedicate a certain share of their storage space to strategic storage, which is not commercially available and with costs socialised amongst market participants

The systemic value of natural gas storage is not remunerated through market mechanisms and hence could require recognition from the regulatory framework.

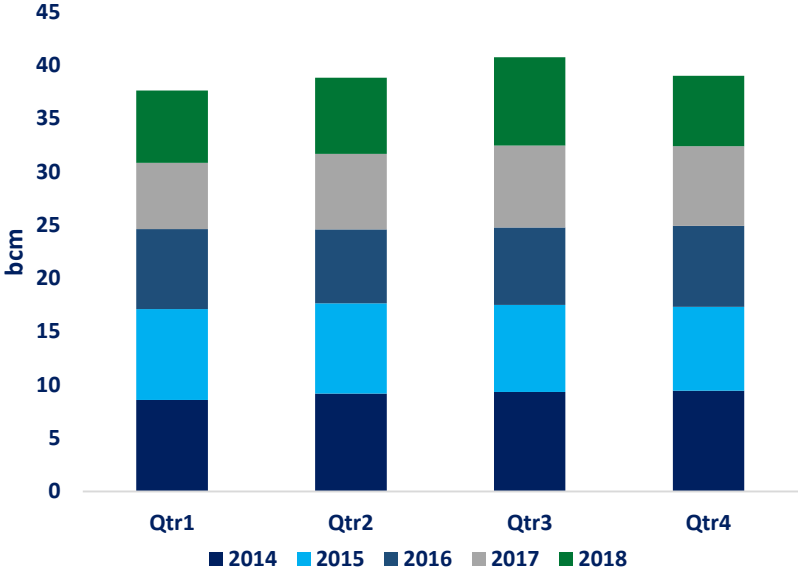
Conclusions

- **Underground natural gas storage** can be a **key provider of flexibility supply** if natural endowment and investment decisions make it available to the market
- In **liberalised gas markets** gas storage system operators shall ensure a **non-discriminatory and transparent offering of storage products** and services
- **Storage** could allow **optimization of LNG imports** in a context of high price variability, whilst increasing **volatility of gas-fired power generation** benefits the **extrinsic value** of storage
- **The systemic value** of natural gas storage derives from its contribution to a more **optimal network development** and a more **secure gas deliverability**
- The **systemic value** of natural gas storage is not remunerated through market mechanisms and hence could **require recognition from the regulatory framework**

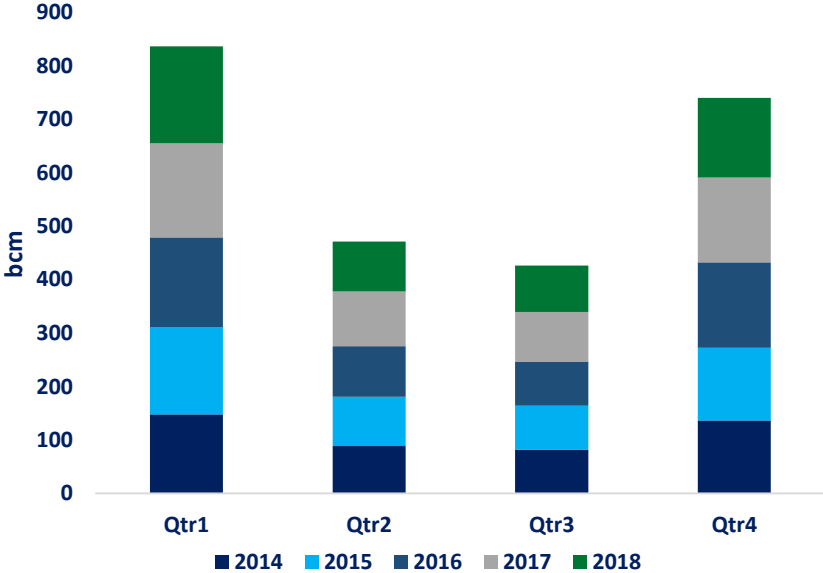
iea

Brazil's gas consumption shows a less pronounced seasonality

Brazil's quarterly gas consumption (2014-18)



OECD Europe's quarterly gas consumption (2014-18)



Low seasonal demand variability in Brazil suggests that summer-winter price spreads would be tighter than in Europe.