

EFET, Turkish Delegation Visit

EU storage market and relevance for
security of supply

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Gas Storage vs Demand, EU 28

bcm	Storage Working Gas Volume**	Gas Demand*	Storage over Demand
Germany	22,4	70,8	32%
UK	4,2	65,7	6%
Italy	16,6	56,2	30%
France	12,0	35,9	33%
The Netherlands	10,2	32,0	32%
Spain	2,5	26,3	10%
Poland	2,8	14,8	19%
Belgium	0,8	14,0	6%
Romania	3,5	11,0	32%
Hungary	6,2	8,2	76%
Austria	4,7	7,1	66%
CzechRepublic	3,3	6,8	48%
EU 28	94,5	370,7	25%

*Demand figures from Eurogas figures for 2014 in Energy unit all translated at the same energy content into volume

**Storage data: Gas Infrastructure Europe for 2015, IEA and others

- ▶ The EU 28 gas market is not homogeneous
 - ▶ Virtual trading point and market liquidity
 - ▶ Gas consumption profile, heating vs industrial use
 - ▶ Gas supply sources
- ▶ Typical seasonal flows due to storage imbalance in between liquid gas markets
 - ▶ UK flow to The Netherlands and Germany into storages during summer; German and Dutch flows to UK during winter

Gas Storage Regulation

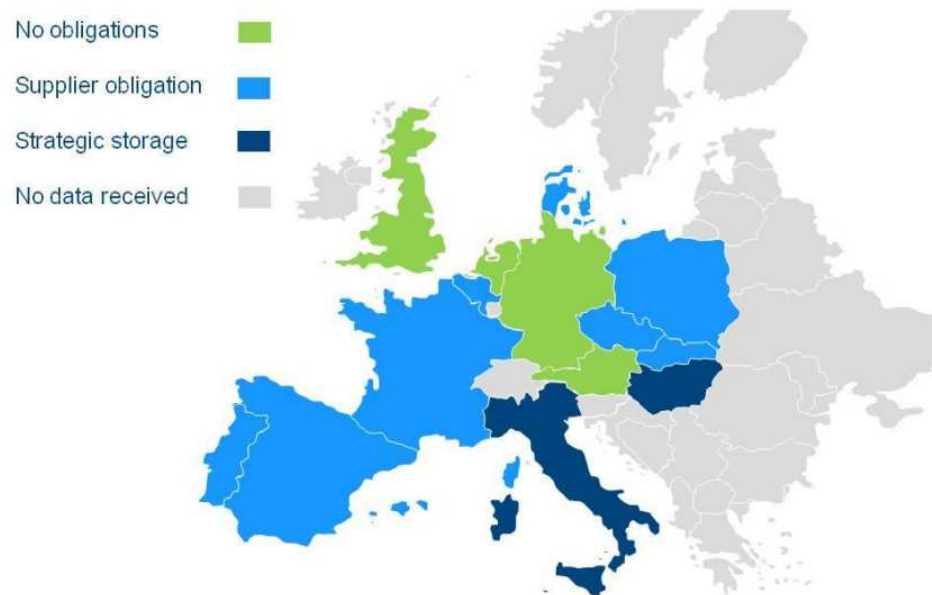
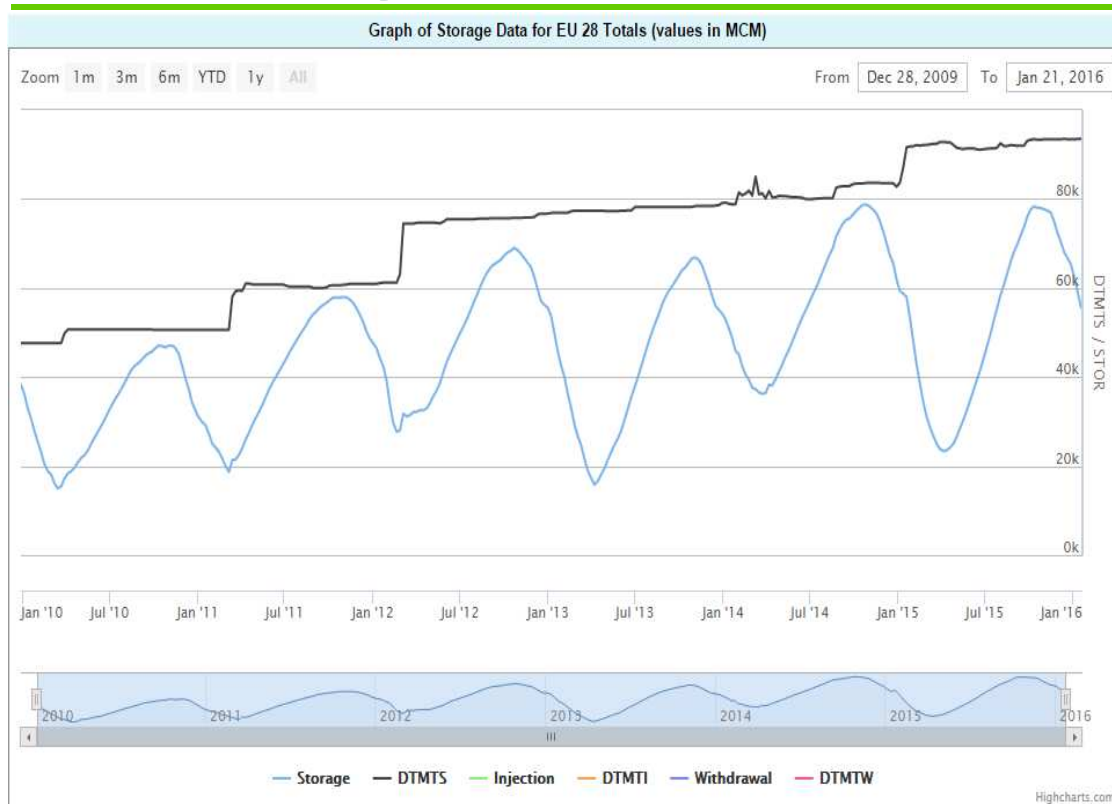


Figure 7: Map showing current interventions in the storage market in Europe³⁹

Source: CEER

- ▶ Gas Storage is in contrast to gas transport capacities not heavily regulated on EU level
 - ▶ National regulations however can be quite strong
- ▶ Current EU policy:
 - ▶ Liberalized storage access
 - ▶ Competition in between storage and other flexibility sources
 - ▶ Transparency on storage usage

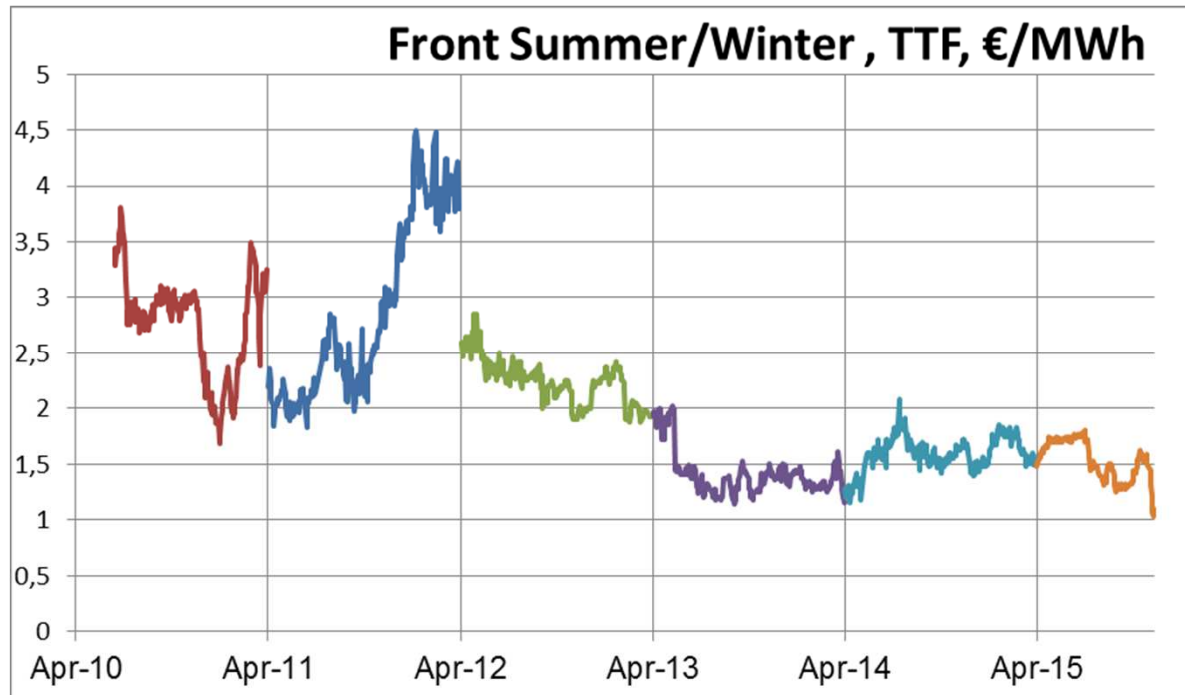
Gas Storage utilization



Source: gie (<http://transparency.gie.eu/>), DMTS: Declared Total Maximum Technical Storage in mcm

- ▶ Gas storage working gas volume has significantly increased since 2009
- ▶ At the same time gas storage received additional competition
 - ▶ significant LNG regas terminal capacity was built
 - ▶ market liberalization and efficiency has improved
 - ▶ North Stream commissioned
 - ▶ Gas producers adjust seasonally and sometimes even short term to demand

Summer Winter Spread



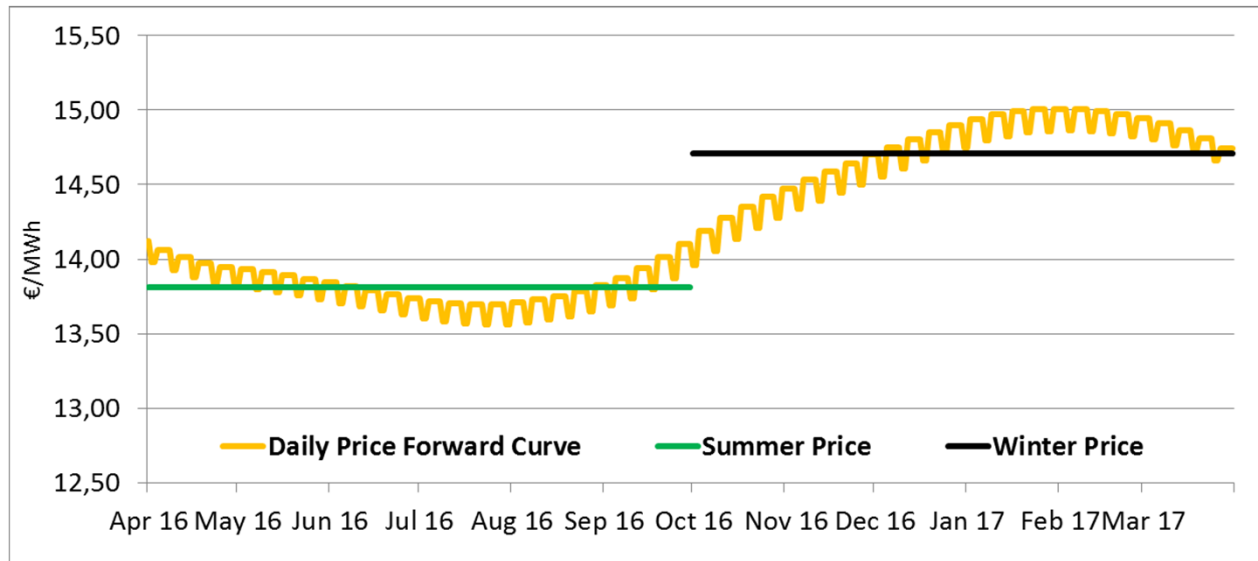
Storage Year	Delivered S/W, TTF, €/MWh
08/09	-4,94
09/10	1,76
10/11	4,01
11/12	1,01
12/13	3,14
13/14	-0,92
14/15	3,17
15/16	-4,25

- ▶ Gas storages have seen significant competition as flexibility provider
 - ▶ Seasonal Flexibility: Gas production flexibility, LNG, market liberalization
 - ▶ Operational Flexibility: Line pack, LNG Storage, market liberalization
- ▶ Storage value has dropped dramatically

Market liberalization

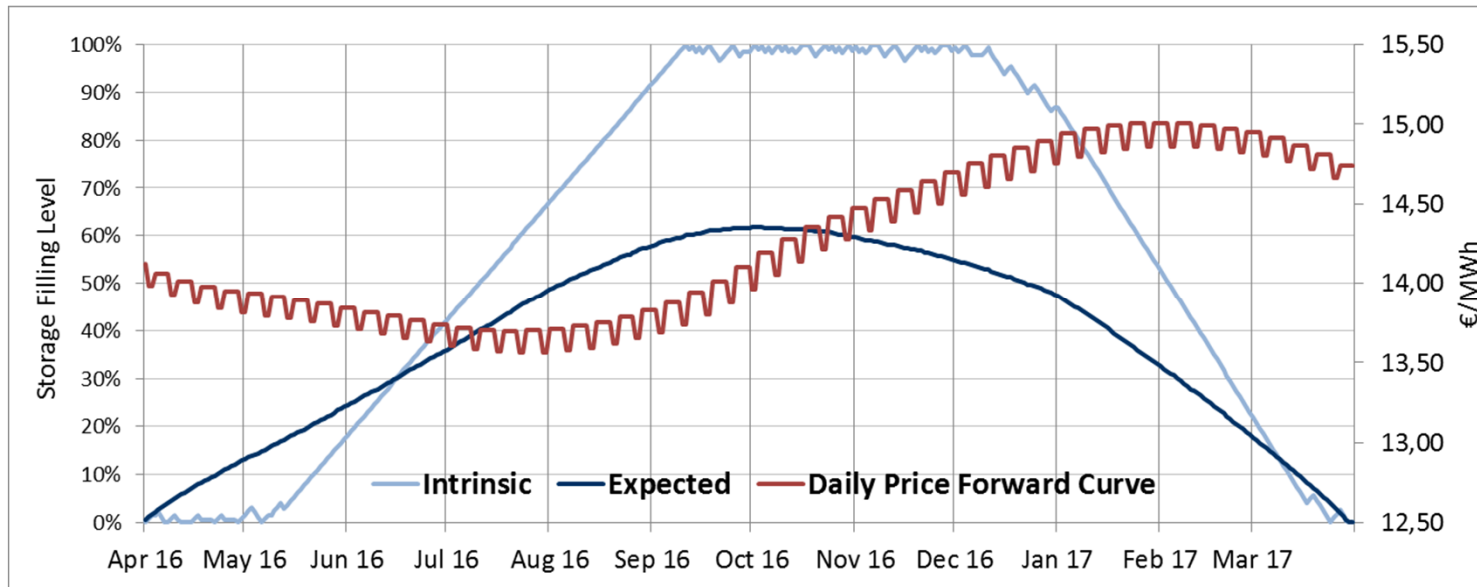
- ▶ Some European gas markets have significantly liberalized over the last ten years allowing for efficient use of storage flexibility
 - ▶ Forward market liquidity at virtual trading points
 - ▶ Spot and intraday market liquidity at virtual trading points
 - ▶ Entry/Exit system and transport capacity auctioning
 - ▶ Fall of gas customer monopolies have allowed efficient operators into the market
- ▶ For gas shippers and end customer suppliers storages have become an expensive way to supply seasonal and operational flexibility
 - ▶ Low seasonal price spreads
 - ▶ Capital cost for storing gas

Storage Valuation in a liberalized market



- ▶ Liquid market value of a “standard” storage, example:
 - ▶ Summer Winter Spread: 0.9 €/MWh(Working Gas Volume)
 - ▶ Intrinsic Value: 1.22 €/MWh
 - ▶ Spot Value: 1.82 €/MWh
- ▶ Typically traded at or above intrinsic value

Storage Optimization in a liberalized market



- ▶ Storage gas exposures (intrinsic, expected) are hedged in standard product markets or against other portfolio exposures (e.g. end customer sales)
- ▶ Flexibility value can be realized in short term dispatch against spot and intraday markets or marketed in form of flexible gas sales