

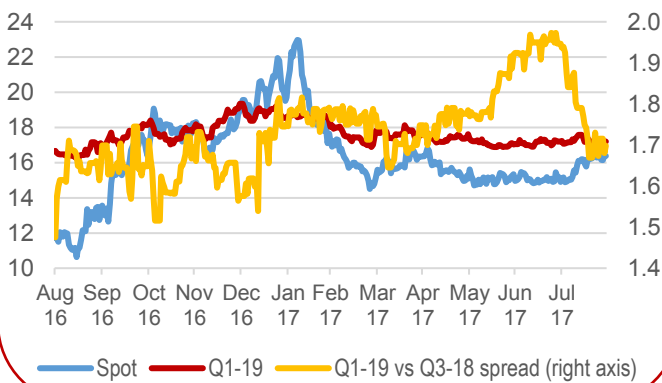


Gas Storage and Swing Report

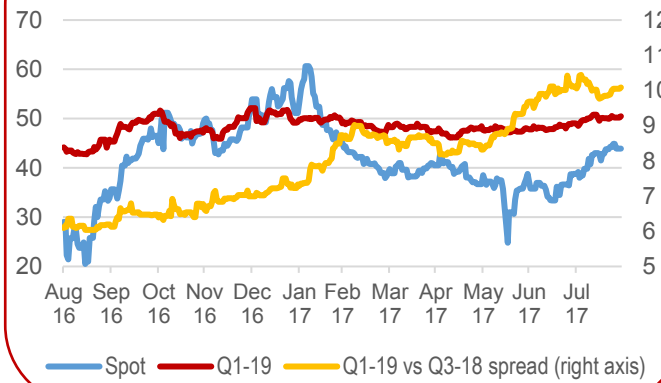
Storage	Market	Product	Period	Cycle Cost	Intrinsic	Rolling Intrinsic		Option	
						Avg	10%	Avg	10%
	TTF	30/30	SY2018	0.75	0.75	0.97	0.93	2.02	1.53
	TTF	60/60	SY2018	0.75	0.75	0.89	0.84	1.48	1.24
	TTF	60/120	SY2018	0.75	0.66	0.82	0.78	1.22	1.01
	NBP	30/30	SY2018	1.50	7.87	10.23	9.40	19.03	16.43
	NBP	60/60	SY2018	1.50	7.87	9.50	9.08	13.92	12.60
	NBP	60/120	SY2018	1.50	7.45	9.10	8.77	11.77	10.73

Swing	Market	Max/day	Min/Max	Period	Price	Intrinsic	Rolling Intrinsic		Option	
							Avg	10%	Avg	10%
	TTF	4	360/360	2018	17.18	0.00	0.08	0.02	0.20	0.00
	TTF	1	0/365	2018	17.18	0.01	0.44	0.09	0.57	0.11
	TTF	4	360/360	2018	MA	0.00	0.36	0.22	0.84	0.51
	NBP	4	360/360	2018	50.59	0.24	0.77	0.17	1.25	0.51
	NBP	1	0/365	2018	50.59	0.13	1.22	0.42	1.26	0.48
	NBP	4	360/360	2018	MA	-0.02	2.45	1.71	3.85	2.73

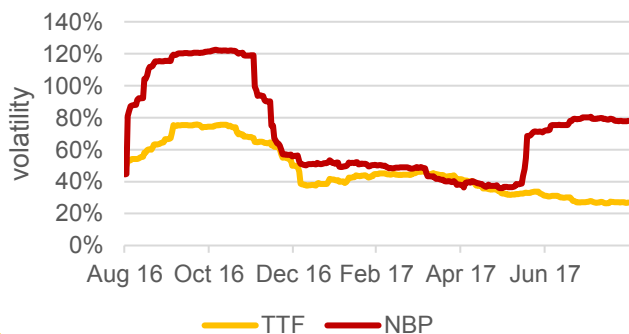
TTF price history



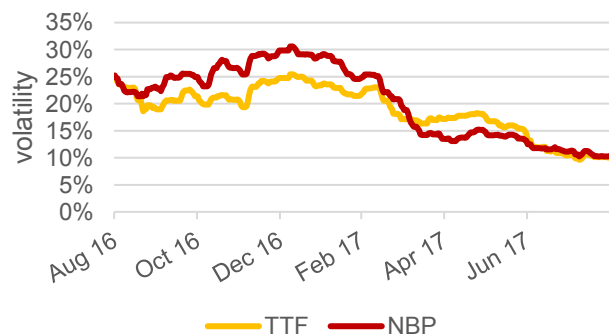
NBP price history



Spot volatility - 3 month moving window

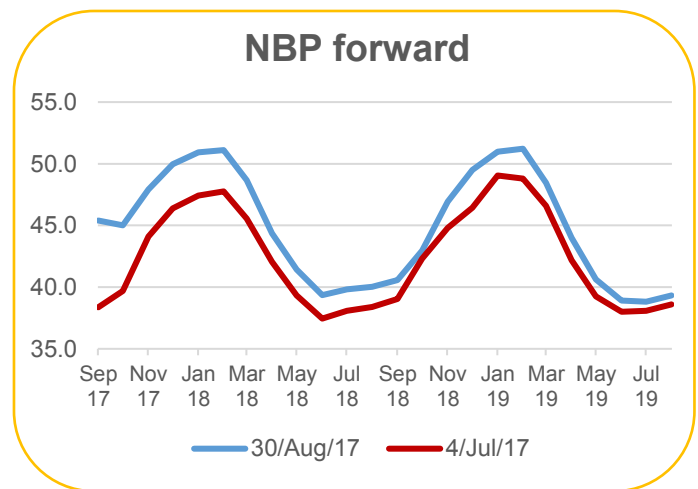
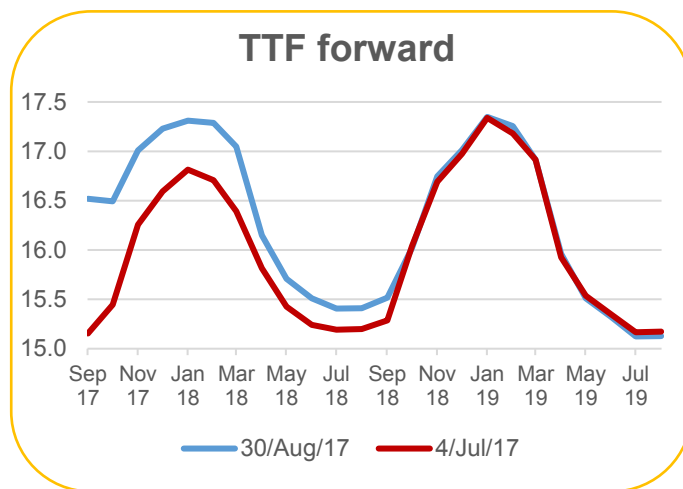


Forward volatility - 3 month moving window



Market	Spot Volatility					Year-ahead Forward volatility				
	1m	3m	6m	12m	KYOS sugg.	1m	3m	6m	12m	KYOS sugg.
TTF	22% ↓	27% ↓	30% ↓	47% ↓	40% ↓	9% ⇔	10% ↑	14% ↑	18% ↑	15% ⇔
NBP	34% ↓	78% ↑	62% ↓	80% ↑	65% ⇔	10% ↓	10% ↓	12% ↑	20% ↑	15% ⇔
GPL	19% ↓	23% ↓	32% ↓	49% ↓	40% ↓	8% ↑	10% ↑	14% ↑	18% ↑	15% ⇔
NCG	26% ↓	30% ↓	33% ↓	50% ↓	40% ↓	9% ↑	10% ↑	14% ↑	18% ↑	15% ⇔
PEG-N	28% ↓	34% ↓	34% ↓	52% ↓	40% ↓	9% ↑	10% ↑	14% ↑	18% ↑	15% ⇔

Price Forward Curves



Market Trend

Gas storage

Because we are now too far into storage year 2017 for making a sensible storage valuation, we have shifted the reporting to storage year 2018. For that reason, a direct comparison with the previous report has been left out. This also means the reported winter-summer forward spread in the graph is for the next storage year, and equal to the difference between the Q1-19 and Q3-18 forwards. This spread has shown a steady increase on NBP and currently hovers around 10 p/th. On TTF the winter-summer spread is much lower at 1.7 €/MWh. The NBP spot price has sustained its higher level; for the valuations, similar to the report of 2 months ago, we continued to use 65%. On TTF, the spot price volatility went down and we are using 40% for the reported option and rolling intrinsic values.

Swing

The fixed-price swing contracts now have a strike price equal to the Q1-18 forward product. In previous reports it was typically below that level and hence all reported values came down.

Explanation

Storage

- Product: 60/120 means 60 days of withdrawal and 120 days of injection capacity.
- The storage values are expressed per MWh (or therms) of working volume.

Swing

Product:

- Max/day is the maximum daily take
- Min/Max are the minimum and maximum annual take

Price

- Either a fixed price (e.g. 18) or
- Month-ahead indexed price (MA)

The swing values are per MWh or therms of contract volume, which is 365 for the daily callable options (max 1 per day) and 360 for other contracts (max 4 per day).

Volatilities

The volatilities are derived from the end-of-day settlement prices of gas spot and futures exchanges. They are calculated with a history of 1, 3, 6 and 12 months. The 'KYOS suggested' volatilities are our expert view, considering the historical estimates as well as recent market developments. These estimates are used for the valuations.

Valuation Methodologies

- All valuations have been performed with KYOS software and models, KyStore and KySwing. They are expressed in €/MWh (TTF) or p/th (NBP). Inputs include the spot and forward volatilities from the table in this report, as well as forward curves and some other settings.
- The trading date for all values is 30 Aug 2017
- A discount rate of 2% has been applied.
- Intrinsic values are derived from the tradable products in the market.
- Rolling intrinsic and option values are derived from Monte Carlo simulations of spot and forward prices:
 - Rolling intrinsic: the intrinsic value is locked in initially with tradable products; then this position, including spot, may be adjusted daily to capture extra value.
 - Option value: the spot trades are optimized, taking into account the optionality of the asset, based on the least-squares Monte Carlo method. In addition, the position is delta hedged in the forward market to minimize the risk.
 - Of the rolling intrinsic and option value, the table shows the average across the simulations and the 10th percentile, which is a more conservative value estimate.
 - In all trading strategies, the model takes into account transaction costs of 0.02 €/MWh (TTF) or 0.02 p/th (NBP).

Contact us for more information about the models and assumptions underlying this report, or to request a demonstration of the KYOS software.

Contact information: www.kyos.com/contact

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