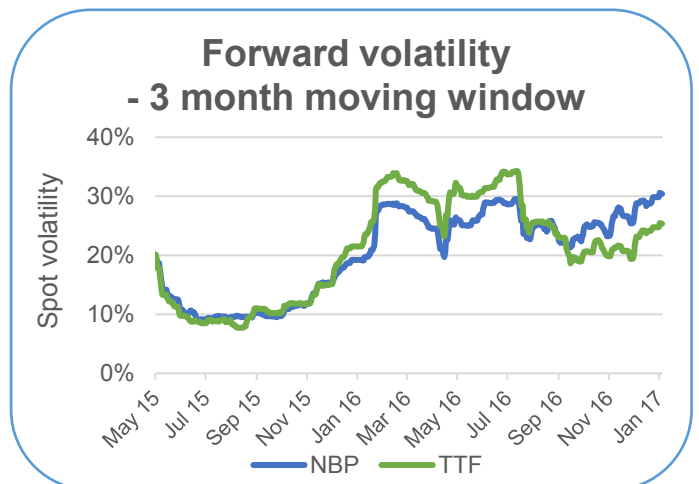
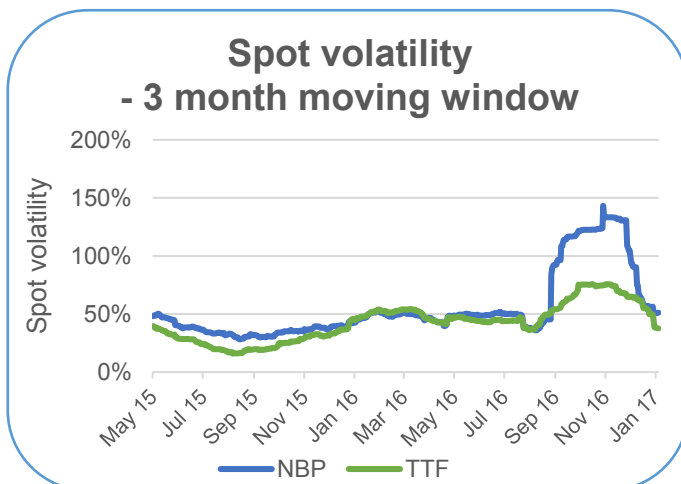
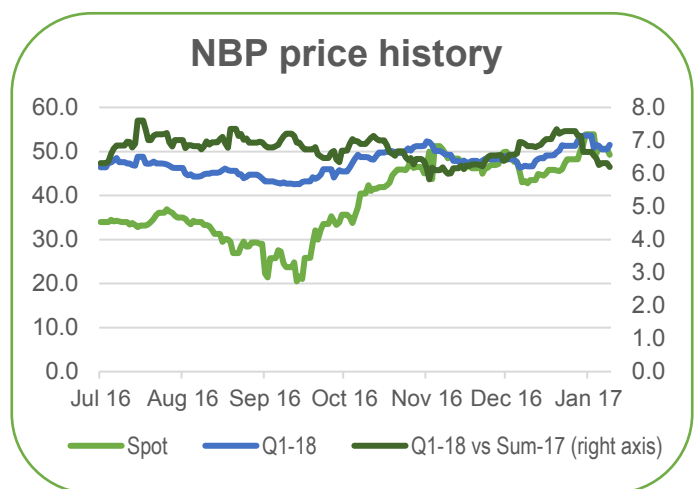
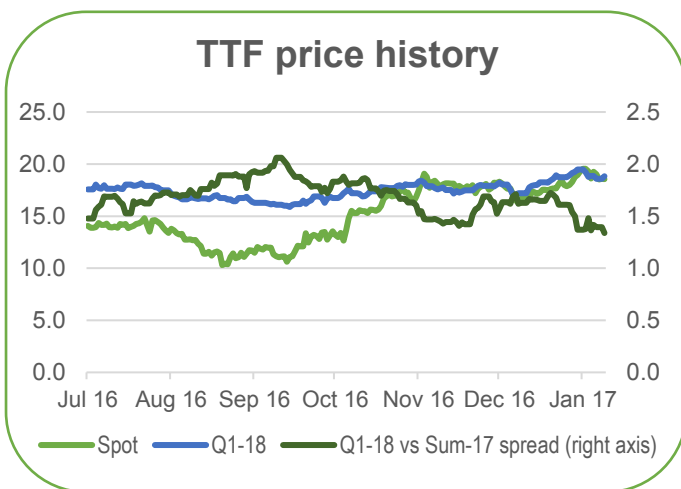




Gas Storage and Swing report

Storage	Market	Product	Period	Unit	Injection cost	Withdr. cost	Intrinsic	Rolling Intrinsic	Option
	TTF	30/30	SY2017	€/MWh	0.50	0.25	1.07 ↓	3.12 ↑	3.86 ↑
	TTF	60/60	SY2017	€/MWh	0.50	0.25	1.02 ↓	2.15 ↑	2.44 ↑
	TTF	60/120	SY2017	€/MWh	0.50	0.25	0.97 ↓	1.66 ↓	1.88 ↓
	NBP	30/30	SY2017	p/th	1.00	0.50	6.67 ↑	16.53 ↓	18.70 ↓
	NBP	60/60	SY2017	p/th	1.00	0.50	6.50 ↑	11.77 ↓	12.73 ↓
	NBP	60/120	SY2017	p/th	1.00	0.50	6.32 ↑	9.55 ↓	10.27 ↓

Swing	Market	Max per day	Min/Max	Period	Unit	Price	Intrinsic	Rolling Intrinsic	Option
	TTF	4	360/360	2018	€/MWh	18.00 ↑	1.13	1.33	1.49
	TTF	1	0/365	2018	€/MWh	18.00 ↑	0.38	2.03	2.23
	TTF	4	360/360	2018	€/MWh	MA	-0.02	0.83	1.48
	NBP	4	360/360	2018	p/th	48.00 ↑	4.65	5.22	5.76
	NBP	1	0/365	2018	p/th	48.00 ↑	1.42	5.87	5.91
	NBP	4	360/360	2018	p/th	MA	-0.02	3.16	4.84



Market	Spot Volatility					Year-ahead Forward volatility				
	1m	3m	6m	12m	KYOS sugg.	1m	3m	6m	12m	KYOS sugg.
TTF	29% ↓	50% ↓	60%	56%	60%	32% ↓	25% ↓	23%	29%	25% ↑
NBP	36% ↓	56% ↓	99% ↑	79% ↑	65% ↓	35% ↑	30% ↑	27% ↑	28% ↑	25% ↑
GPL	34% ↓	54% ↓	61% ↓	57% ↓	60%	31% ↑	24% ↑	22%	29%	25% ↑
NCG	40% ↓	54% ↓	61% ↓	60%	60%	31% ↑	24% ↑	22%	28%	25% ↑
PEG-N	51% ↓	57% ↓	61%	58% ↓	60%	32% ↑	24% ↑	22%	28%	25% ↑

Price Forward Curves

Month	1-17*	2-17	3-17	4-17	5-17	6-17	7-17	8-17	9-17	10-17	11-17	12-17
TTF	20.14	20.01	19.64	18.70	17.87	17.52	17.47	17.56	17.62	18.08	18.79	19.11
NBP	54.68	55.08	53.58	50.25	46.96	45.00	45.17	45.31	45.66	47.23	50.60	52.26

Month	1-18	2-18	3-18	4-18	5-18	6-18	7-18	8-18	9-18	10-18	11-18	12-18
TTF	19.33	19.27	18.86	17.94	17.58	17.38	17.13	17.14	17.26	17.80	18.49	18.77
NBP	53.10	53.20	51.75	48.24	45.19	43.73	44.02	44.19	43.88	47.11	49.22	49.83

* Note: from 14 January 2017

Market Trend

Gas storage

On TTF the winter-summer spread decreased, whereas on NBP it increased slightly. This explains the lower TTF intrinsic values and higher NBP intrinsic values compared to previous month. The rolling intrinsic and option values show a different pattern, with TTF values mostly higher and NBP values all lower.

For TTF, the rise in value is mainly explained by higher forward market prices (almost +2 €/MWh), whereas for NBP it is mainly explained by the lower spot volatility (from 80% to 65%).

Swing:

In comparison to the December 2016 report, we have contracts for delivery in 2018 instead of 2017. Also, because the market prices moved up, we raised the fixed strike prices from 16 to 18 (TTF) and from 45 to 48 (NBP). Despite this rise, the intrinsic values are a bit higher than last time.

The rolling intrinsic values and option values rose as well, due to a mix of higher spot volatility (NBP) higher forward market prices (NBP and TTF) and higher intrinsic values.

Explanation

Storage

- Product: 60/120 means 60 days of withdrawal and 120 days of injection capacity
- Injection and withdrawal cost: costs of an injection and withdrawal, including entry-exit costs
- The storage values are expressed per MWh 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 terms of contract volume, which is 365 for the daily callable options (max 1 per day) and 360 for the other contracts (max 4 per day, 90 days)

Volatilities

The volatilities are derived from the end-of-day settlement prices of gas spot and futures exchanges. They are based on a history of 1, 3, 6 and 12 months. The 'KYOS suggested' volatilities are based on 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. Inputs include the market parameters from the table above, column 'KYOS suggested', as well as forward curves and some other parameters and settings.
- The trading date for all valuations is 13 January 2017.
- No discount rate has been applied
- Intrinsic values are derived from the monthly forward curve
- 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; then every day the intrinsic position, including spot, may be adjusted to capture extra value; the average result is shown.
 - 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.

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

KYOS energy asset optimization and valuation: www.kyos.com/energy-asset-optimization

E-mail: info@kyos.com

