

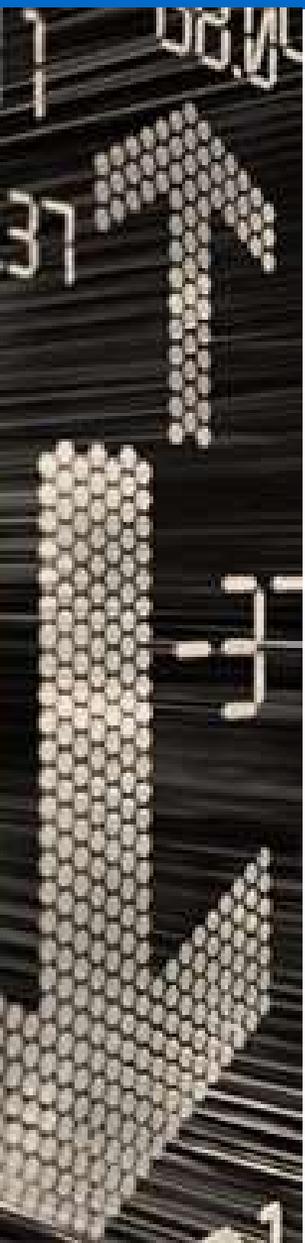
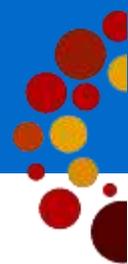
Gas

Gas storage and swing report

No 35 – July 2022



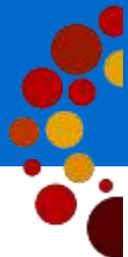
Storage and swing contract developments



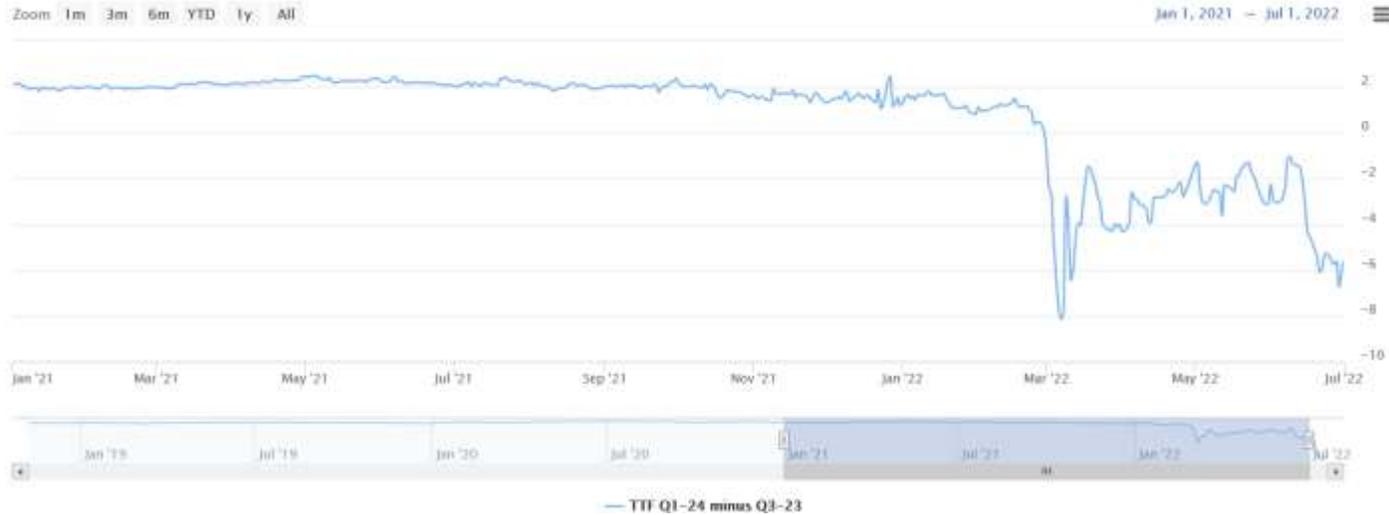
| Storage | Market | Product | Period | Cycle Cost | Intrinsic | Rolling Intrinsic | | Option | |
|---------|--------|---------|--------|------------|-----------|-------------------|----------|---------|---------|
| | | | | | | Average | 10% | Average | 10% |
| | TTF | 30/30 | SY2023 | 0.50 | 0.05 ▲ | 25.27 ▲ | 11.21 ▲ | 24.39 ▲ | 15.25 ▲ |
| TTF | 60/60 | SY2023 | 0.50 | 0.05 ▲ | 13.92 ▲ | 6.72 ▲ | 14.35 ▲ | 7.86 ▲ | |
| TTF | 60/120 | SY2023 | 0.50 | 0.04 ▲ | 9.78 ▲ | 5.11 ▲ | 10.21 ▲ | 4.03 ▲ | |
| NBP | 30/30 | SY2023 | 1.00 | 20.00 ▲ | 102.50 ▲ | 60.03 ▲ | 103.23 ▲ | 75.97 ▲ | |
| NBP | 60/60 | SY2023 | 1.00 | 20.00 ▲ | 64.40 ▲ | 42.10 ▲ | 66.07 ▲ | 47.83 ▲ | |
| NBP | 60/120 | SY2023 | 1.00 | 15.33 ▲ | 48.88 ▲ | 31.18 ▲ | 50.88 ▲ | 35.75 ▲ | |

| Swing | Market | Max/day | Min/Max | Period | Price | Intrinsic | Rolling Intrinsic | | Option | |
|-------|--------|---------|---------|--------|---------|-----------|-------------------|---------|---------|--------|
| | | | | | | | Average | 10% | Average | 10% |
| | TTF | 4 | 360/360 | 2023 | 158.93 | 0.00 ⇔ | 2.08 ▲ | 0.92 ▲ | 2.00 ▲ | 1.25 ▲ |
| TTF | 1 | 0/365 | 2023 | 158.93 | 0.41 ▲ | 10.06 ▲ | 1.83 ▲ | 10.24 ▲ | 1.67 ▼ | |
| TTF | 4 | 360/360 | 2023 | MA | -0.02 ⇔ | 11.70 ▲ | 5.25 ▲ | 14.66 ▲ | 9.99 ▲ | |
| NBP | 4 | 360/360 | 2023 | 412.71 | 0.01 ▲ | 0.03 ▼ | 0.00 ⇔ | -0.37 ▼ | -2.51 ▲ | |
| NBP | 1 | 0/365 | 2023 | 412.71 | 1.24 ▲ | 18.67 ▼ | 1.24 ▲ | 25.00 ▲ | 4.85 ▼ | |
| NBP | 4 | 360/360 | 2023 | MA | -0.02 ⇔ | 32.41 ▲ | 14.16 ▲ | 38.70 ▲ | 26.38 ▲ | |

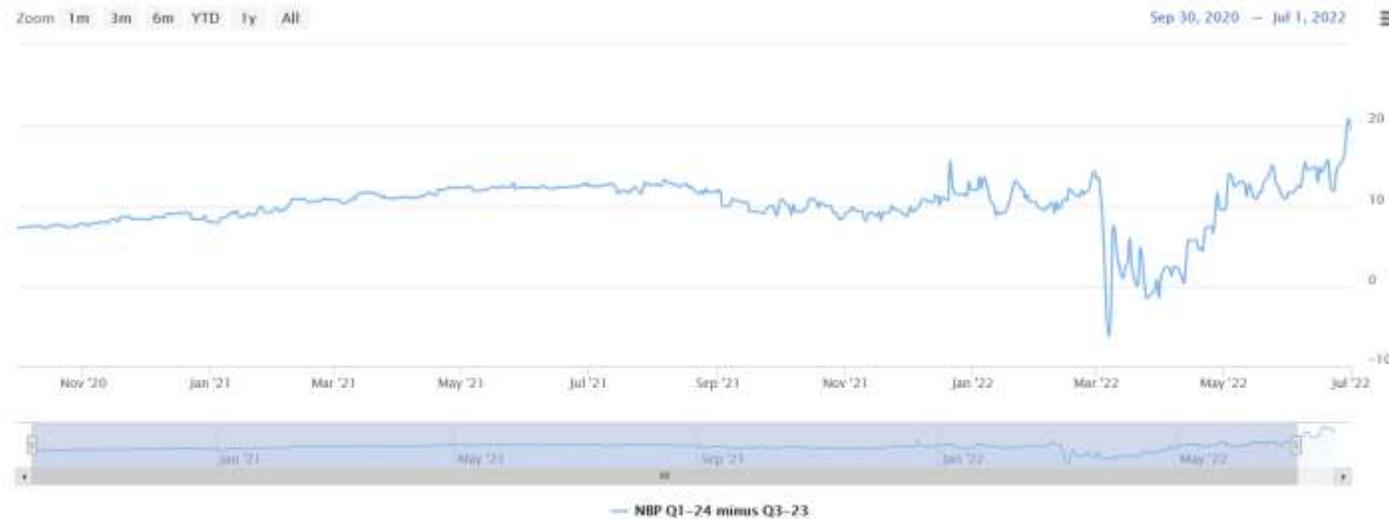
Price history



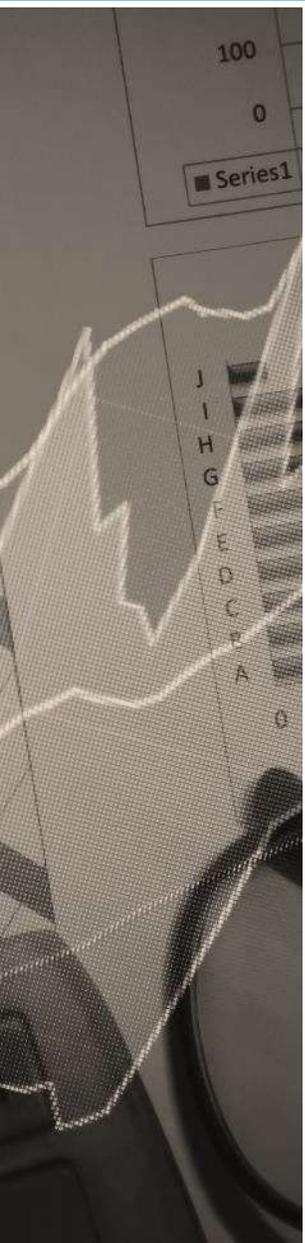
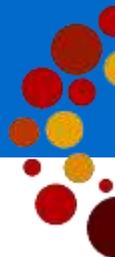
TTF Price History



NBP Price History

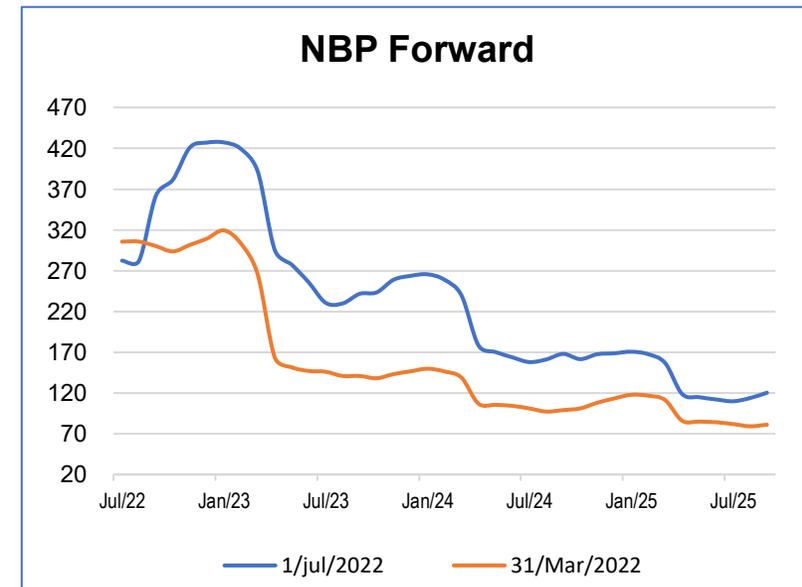
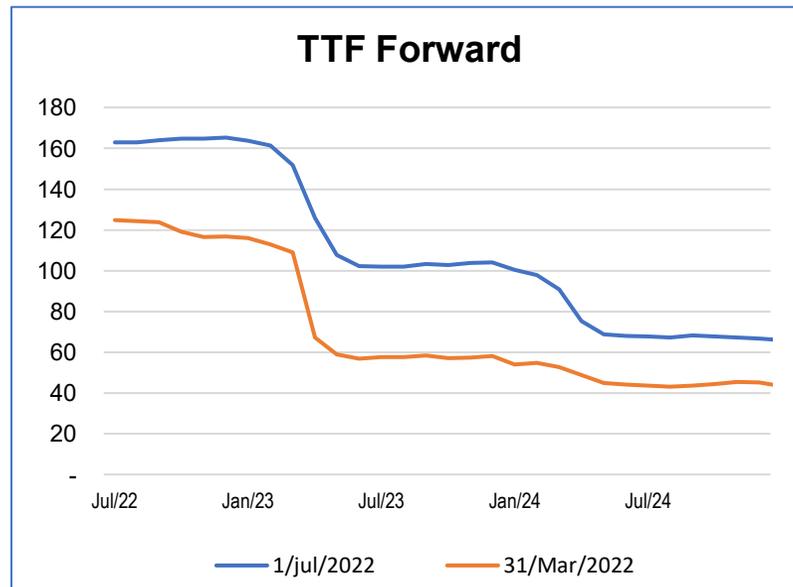


Volatility and price forward curves

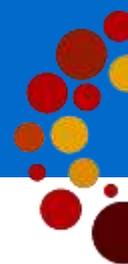


| Market | Spot Volatility | | | | |
|------------|-----------------|--------|--------|--------|------------|
| | 1m | 3m | 6m | 12m | KYOS sugg. |
| TTF | 54% ▼ | 81% ▼ | 93% ▲ | 73% ▲ | 47% ▲ |
| NBP | 556% ▲ | 413% ▲ | 321% ▲ | 238% ▲ | 60% ▲ |
| THE | 65% ▼ | 82% ▼ | 89% ▲ | 73% ▲ | 47% ▲ |
| PEG | 48% ▼ | 90% ▼ | 101% ▼ | 90% ▲ | 49% ▲ |

| Year-ahead Forward volatility | | | | | |
|-------------------------------|-------|-------|-------|-------|------------|
| | 1m | 3m | 6m | 12m | KYOS sugg. |
| | 35% ▼ | 39% ▼ | 80% ▼ | 85% ⇔ | 45% ▲ |
| | 32% ▼ | 38% ▼ | 82% ▼ | 85% ▲ | 47% ▲ |
| | 45% ▼ | 40% ▼ | 80% ▼ | 83% ▲ | 45% ▲ |
| | 33% ▼ | 43% ▼ | 71% ▼ | 83% ▲ | 45% ▲ |



Market Trend



The energy markets continued their volatile trend during the second quarter of 2022. This also led to a lot of attention, even from the general public, about gas storages. And especially about the current inventory levels. Our website gas.kyos.com provides all this information in one easy-to-access place. Our storage valuation model was also important for both existing and new customers, especially with the introduction by the EU of minimum fill level restriction.

Focusing again on the market, both the TTF and NBP forward prices showed another big increase. Even further out periods were strongly affected, reflecting the view of the market that the current gas supply/demand challenges will continue for a long period. The TTF 2024 contract for example, went up 60% to 75 €/MWh.

Interestingly, the shapes of the forward curves of TTF and NBP diverged. Where the NBP shows a decent positive Winter/Summer spread for next storage year, this cannot be seen on the TTF. The Q1-24 x Q3-23 spread on the NBP closed this quarter at just above +20 p/th., whereas the same spread on the TTF closed at -6 €/MWh!

The intrinsic value of our reported NBP storages for next storage year shows now values that we have not seen since we are publishing this gas report. Limited interconnection capacities and ample LNG regas capacities in the UK probably lead to relatively lower Summer prices.

It will be interesting to see whether the build-up of regas capacity in The Netherlands and especially Germany will change the shape of the forward curve.

Our volatility assumptions went up for all hubs. Together with the increase in absolute price levels this leads to higher values for our reported (extrinsic) storage and swing values. The full option value of our 60/120 day TTF storage for example is now assessed at 9.78 €/MWh, or about 60% higher as compared to our previous report.

Current extreme market conditions make it hard to assess volatility levels. We are therefore interested to hear your opinion on our assessments. Where do you see volatility at the moment? Please share your insights at info@kyos.com

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

- A fixed price put at Q1-level 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 1 July 2022.
- 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)

Our knowledge center is a great resource for the latest news, where we publish interesting articles and reports.

Do not hesitate to contact us for more information, or ask for a short demonstration: info@kyos.com



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