Statnett

Norwegian EPAD pilot Q2 2025

Contents

Introduction

This is the second quarterly report presenting results from the Norwegian EPAD auctions. The report provides insights into the auction outcomes, market trends and liquidity measures for Q2 2025. Statnett will continue to publish these quarterly reports to provide ongoing transparency and insights into the progress of the EPAD market. After the first year of operation, Statnett plans to publish a more comprehensive report, offering a detailed analysis of the auction results and market developments over the initial year.

Results

There are several methods for measuring liquidity in auctions. Common methods include participation, volume and price formation. In addition to these, the report also examines the bid-to-cover ratio, implicit price tails and friction costs.

Participation

The first auction in the pilot was conducted on December 10, 2024, and there have been 14 auctions since the launch of the pilot. 7 auctions have been completed in Q2. As shown in Figure 1 below, each auction has so far had between 18-23 participants, with an average of 20 participants per auction. The two auctions with the highest number of participants were in Q2. The number of participants has increased slightly since the first auction, as illustrated with the trend line.

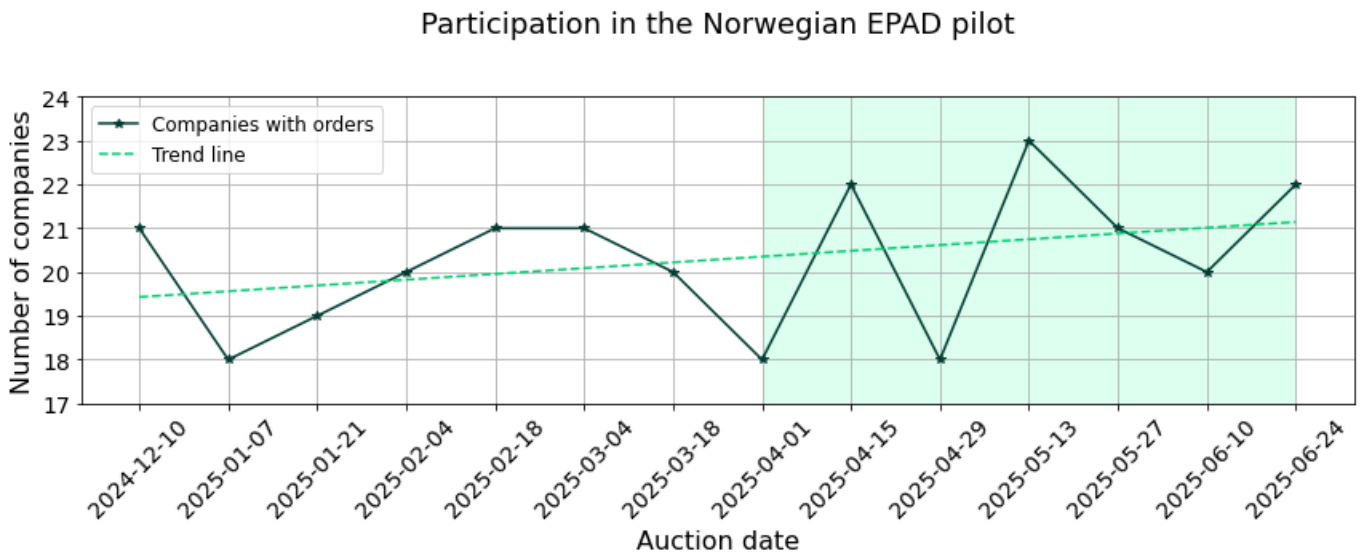

Figure 1: The number of individual companies placing orders in each auction. Q2 is marked as a shaded area in light green. Data source: Nord Pool

Accumulated volumes

For each auction until 29-04-2025, Statnett has offered a volume of 40 MW for the monthly contracts, 20 MW for the Q+1 contracts, 10 MW for the Q+2 contracts, and 5 MW for the annual contracts in each auction. As the volumes accumulate with more auctions, Statnett's targeted exposure of 200-250 MW was reached in April 2025 and maintained in the following months. This is shown in Figure 2 below. In order to limit the positions to 250 MW, the volumes for the monthly contracts were reduced to 25-30 MW in the next auctions. All the volumes offered in the annual and quarterly contracts have been sold. However, not all the volumes offered for the monthly contracts were sold in the auction 15-04-2025.

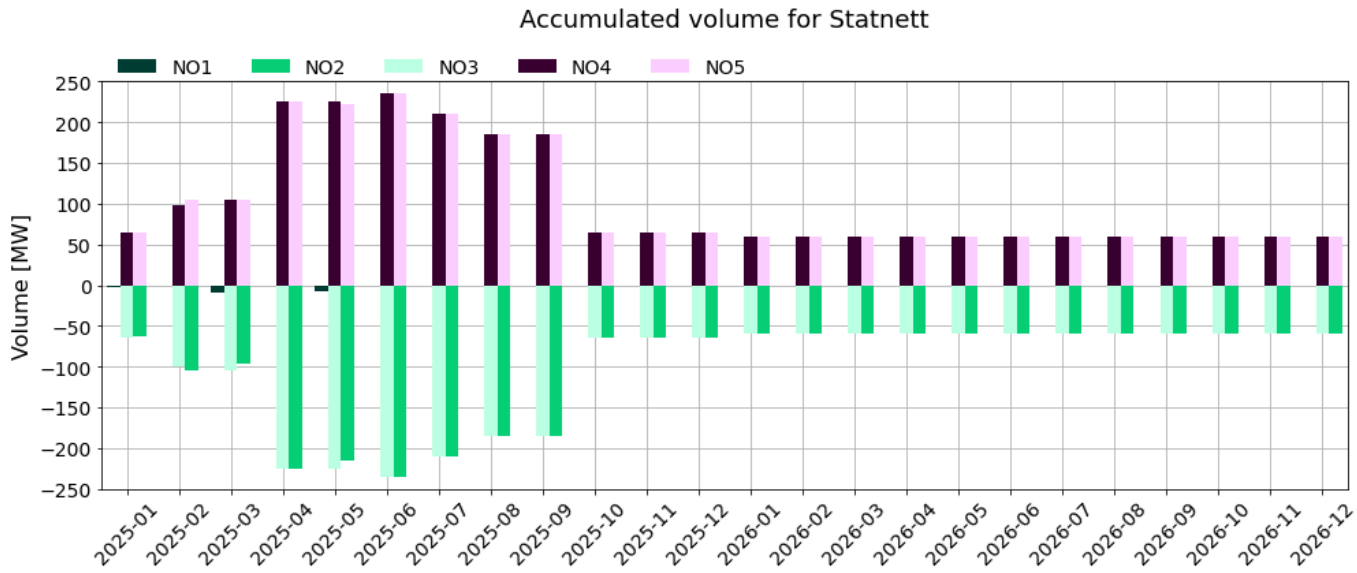

Figure 2: Accumulated volumes for Statnett per bidding zone per month. Data source: Statnett

NO1 is included in two of the auctioned borders: NO1-NO5 and NO1-NO2. In all auctions so far, Statnett has earned a buy position in NO5, and sell position in NO1 in the NO1-NO5 auction. In all auctions for the NO1-NO2 border, Statnett has so far gained a buy position in NO1 and a sell position in NO2. This results in netted positions in NO1 for Statnett, and gives a friction cost. This is examined in more detail later in the report. As such, the NO1 positions have been netted in most of the auctions. For the NO3-NO4 auction, the outcome has been a buy position in the surplus area NO4, and a sell position in NO3. Hence, no changes have happened in terms of auction directions from Q1.

Volumes in the auctions and continuous market

A common method of describing liquidity is by analyzing the traded volumes. This chapter examines the development of EPAD volumes since 2023 and how the auctions have impacted the total EPAD volumes.

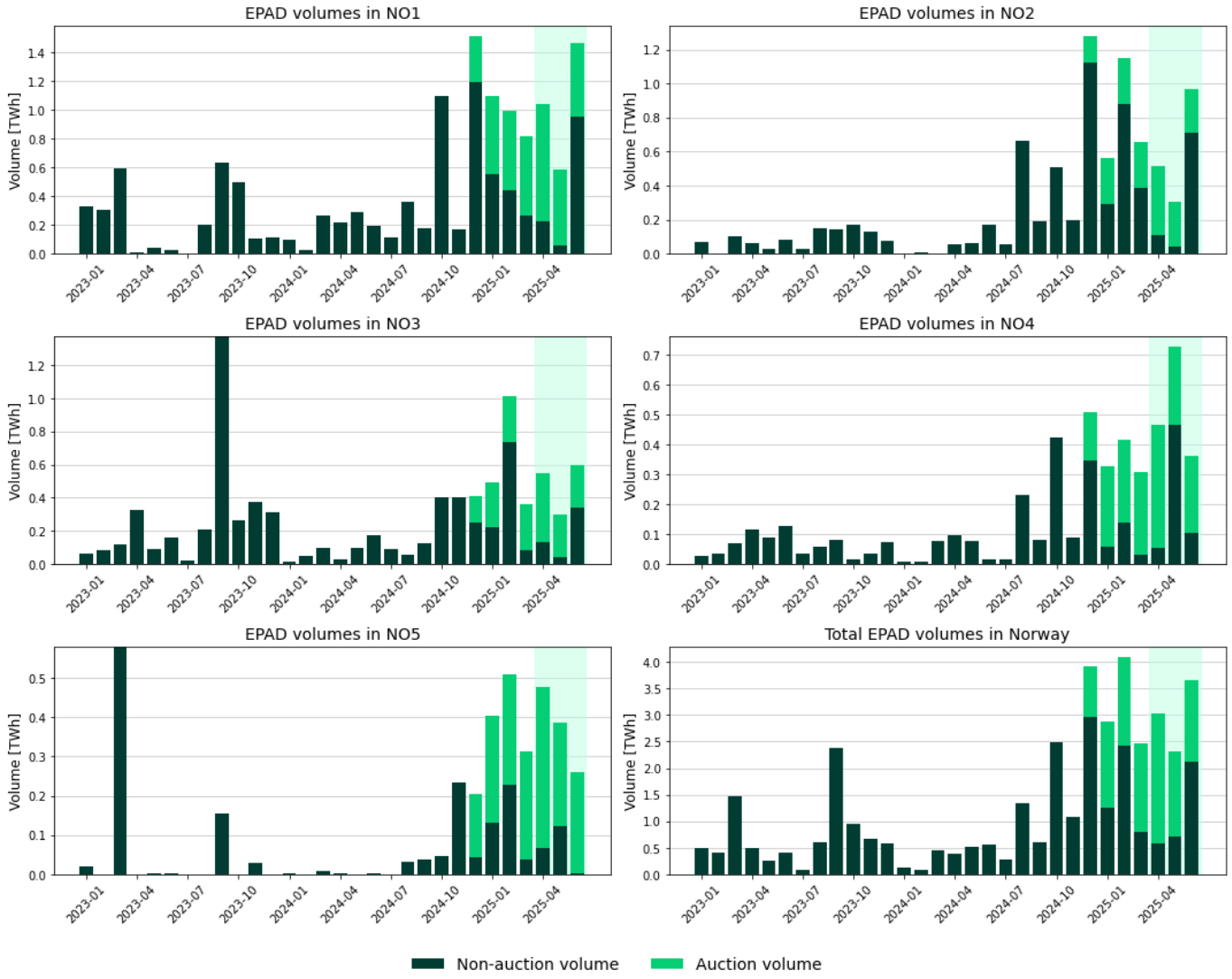

Figure 3: Monthly EPAD volumes in each Norwegian bidding zone, with the total EPAD volume for the bidding zones in the bottom-right plot. The timeframe ranges from 01.01.2023 to 30.06.2025. Q2 is marked as a shaded area in light green. Data source: Nasdaq Commodities.

As described in the Q1 report, the volumes remained low during 2023 and the first half of 2024. However, an increase was observed autumn 2024, a few months before the first EPAD auction 10 December. As shown in Figure 3, the total traded volumes in 2025 remains on the approximately the same level as Q1 2025, with 9.0 TWh in Q2, compared to 9.4 TWh in Q1. The monthly volumes for all Norwegian bidding zones can be observed in the bottom-right plot in Figure 3. The volumes in the auctions accounted for a share of 62 % in Q2. It is still too early to conclude whether the auctions contribute to higher volume in the continuous market.

Bid-to-cover ratio

Bid-to-cover ratio is a way to measure the oversubscription in an auction, and a high bid-to-cover ratio indicates high liquidity in an auction. This is the maximum volume based on the auction criteria, divided by offered volume. A more detailed description can be found in the Q1 report and in the appendix.

The trend from the first quarter has continued, with significantly lower bid-to-cover ratio for the monthly contracts compared to the quarterly and annual contracts. A reason for this is that the offered volume is higher for the monthly contracts. As previously mentioned, the offered volume for the monthly contracts has been reduced to 25-30 MW from the auction 29-04-2025. This would per definition result in a higher bid-to-cover ratio, if the bidding volume remained at the same level as in previous auctions. Despite this reduction, the bid-to-cover ratio has remained at approximately the same level for the monthly contracts for the borders combined, as seen in the upper subplot in Figure 4.

The bid-to-cover ratio has increased for the quarterly contracts for the NO1-NO5 and NO3-NO4 borders in Q2 and decreased for the NO1-NO2 border.

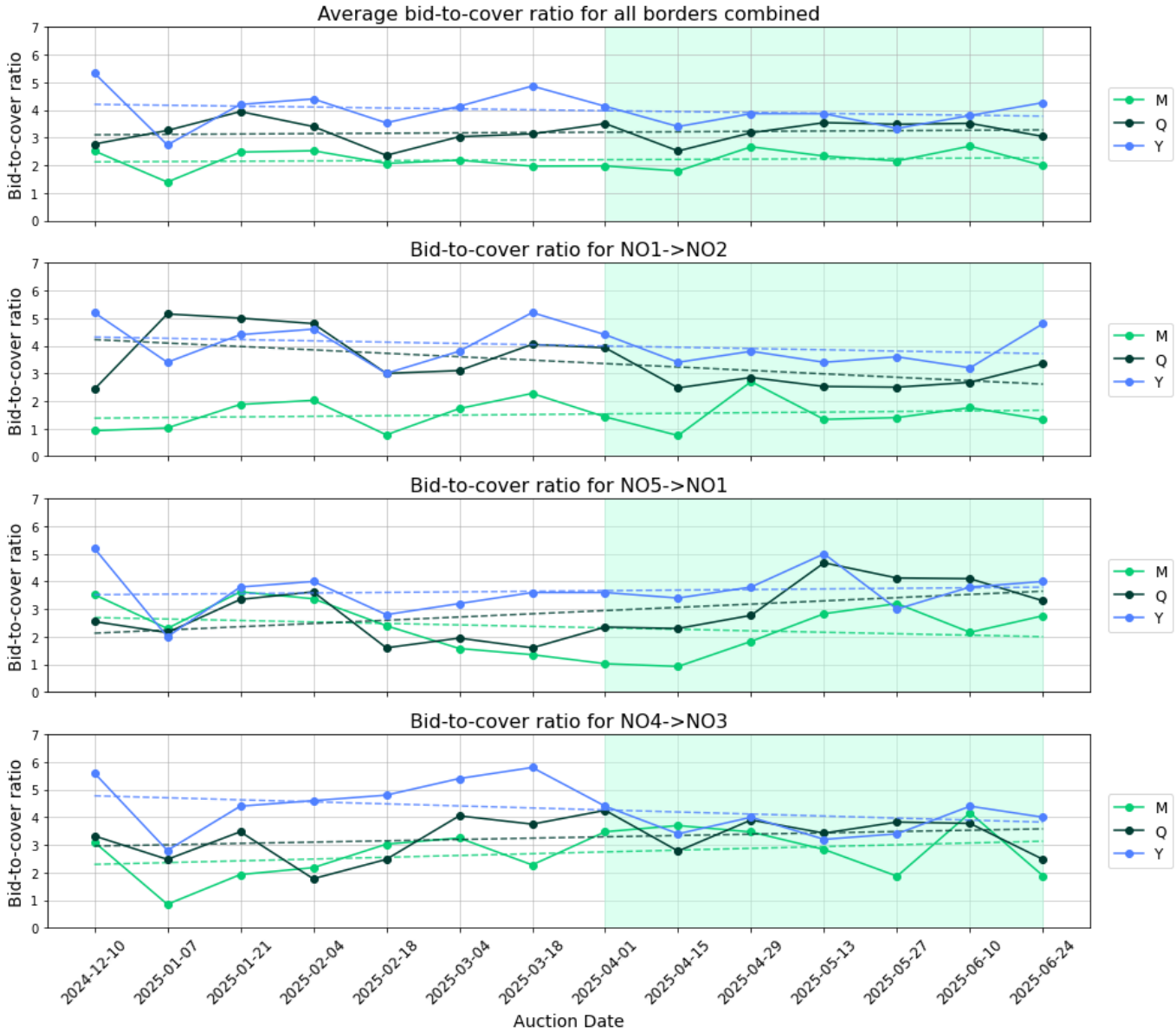

Figure 4: Bid-to-cover ratio per monthly (M), quarterly (Q) and annual (Y) contract for all borders, and the average for all borders combined. Since bid-to-cover ratio is a ratio, no unit is presented on the y-axis. The ratios are marked with a solid line, and the trend lines are dashed. Q2 is marked as a shaded area in light green. Data source: Nord Pool.

Implicit price tails

Another way to describe liquidity and price formation in auctions is the reference to "implicit price tails". The long implicit price tail is defined as the difference between the highest or lowest bid on the buy or sell curve, compared to the marginal price. The short implicit price tail is based on the volume-weighted average price (VWAP). A low implicit price tail is an indicator of good liquidity. A more detailed description of the implicit price tails can be found in the Appendix and Q1 report.

Figure 5: Long implicit price tail per monthly (M), quarterly (Q) and annual (Y) contract for all borders, and the average for all borders combined. The long implicit price tails are marked with a solid line, and the trend lines are dashed. Q2 is marked as a shaded area in light green. Data source: Nord Pool

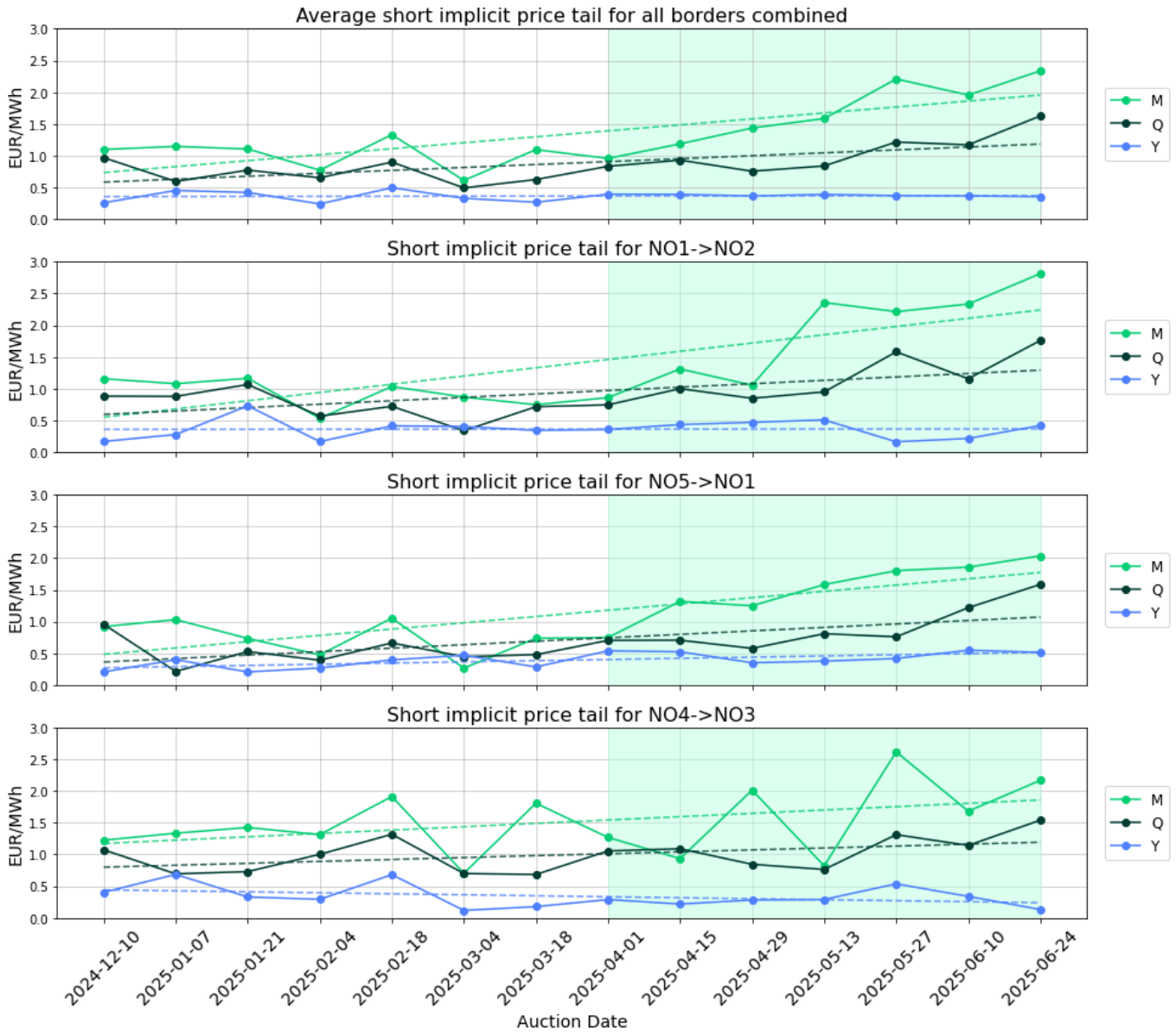

Figure 6: Short implicit price tail per monthly (M), quarterly (Q) and annual (Y) contract for all borders, and the average for all borders combined. The short implicit tails are marked with a solid line, and the trend lines are dashed. Q2 is marked as a shaded area in light green. Data source: Nord Pool

As shown in Figure 5 and Figure 6, the monthly contracts have the highest implicit price tails. Like the bid-to-cover ratio, this is partly a result of the higher offered volume for the monthly contracts. Both the long- and short implicit price tails have been relatively stable for all borders with regards to the annual contracts. However, there has been an increase for the monthly and quarterly contracts throughout the period, and the tails have been particularly high for the last auctions in Q2. For the long implicit price tail, this is primarily explained by the bids observed to the left on the curve, i.e. a few MW of very low or high bids. One example is the last auction in Q2, with a buy - bid of 1 MW in NO2 for the MAUG contract to a price of 45 EUR/MW, and the next bid is 37.07 EUR/MW. Such bids have a significant impact on the long implicit price tails. However, the short implicit price tails will not be affected to the same degree by small individual bids. Hence, the observed increase for the implicit price tails for the monthly contracts indicate lower liquidity for all the borders among these contracts.

Friction costs

The participants submit separate orders for all borders and contracts. As a result, a price difference will often occur between the NO1 buy and NO1 sell contracts. This is referred to as a friction cost and can be considered as a measure of liquidity. A more detailed description can be found in the Q1 report.

As seen in Figure 7, the friction costs declined in Q2 compared to Q1. With an average friction cost of 1.55 million NOK in Q1, including the first auction in December, the average friction cost was 0.72 million NOK in Q2. This decline indicates improved price formation and increased liquidity. From auction design, the friction cost can also be an income, depending on the auction results. This was the case for the auction 27-05-2025, as shown in Figure 7.

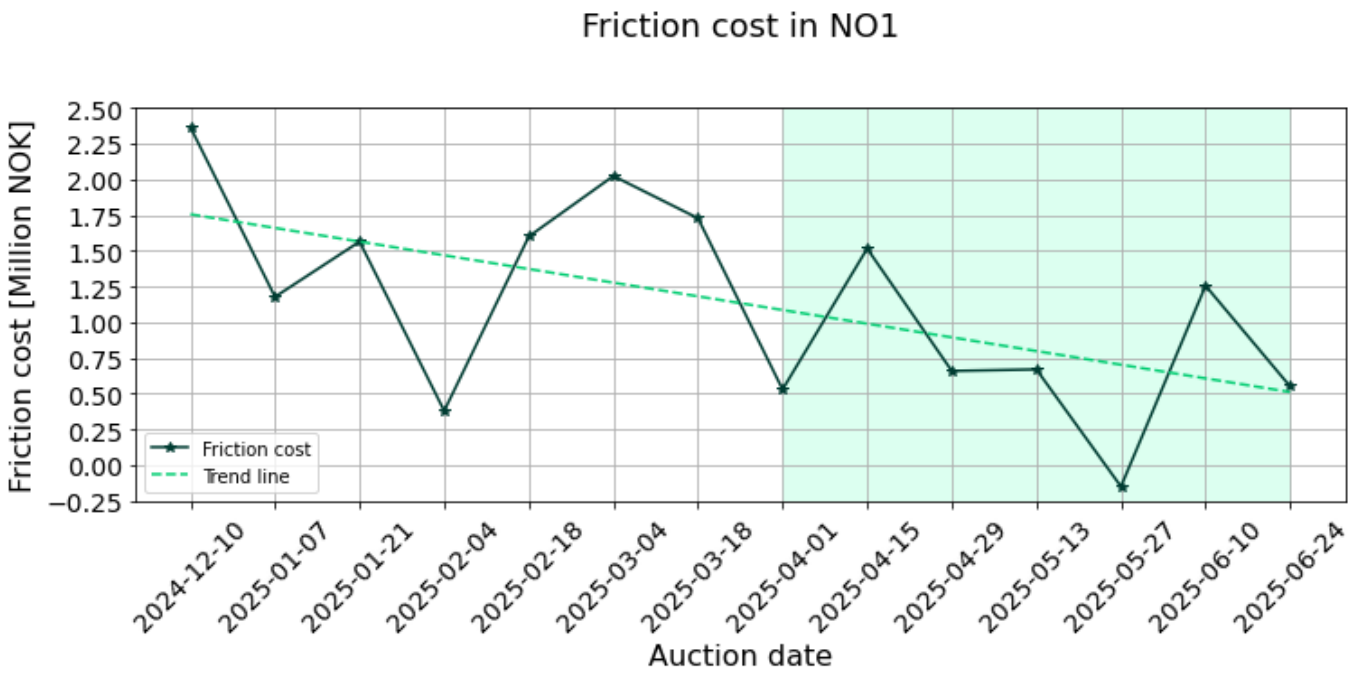

Figure 7: Friction costs in NO1 from the borders NO5-NO1 and NO1-NO2 for each action. Q2 is marked as a shaded area in light green. Data source: Statnett.

Closing price and auction price

As observed in Figure 8, the prices in the EPAD auctions usually establish the price in the continuous market for the following trading days. For the Q3-2025 contracts, this is evident for all the Norwegian bidding zones. However, somewhat higher activity and frequent price changes are observed in NO4.

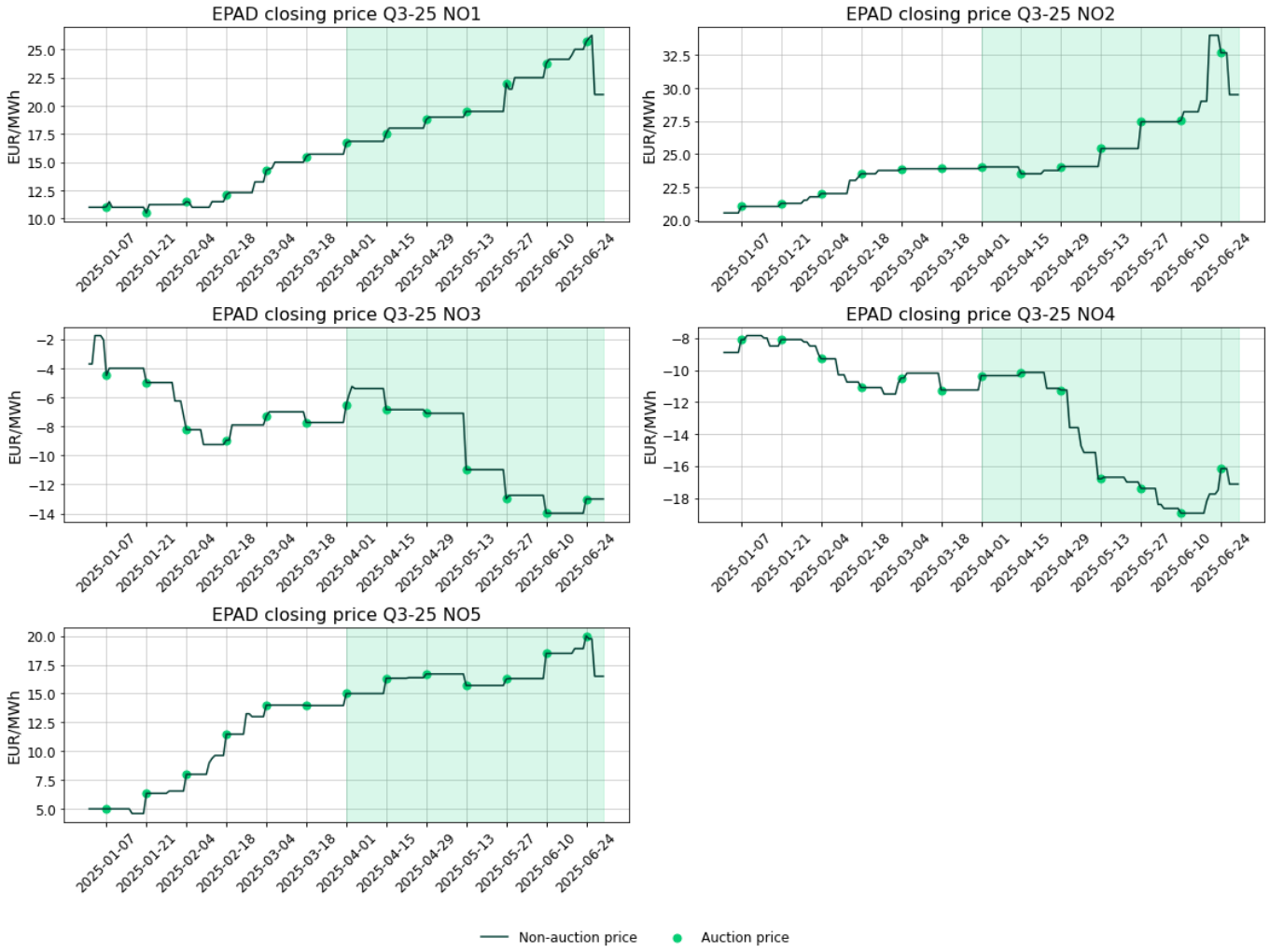

Figure 8: Closing price and auction price for EPAD Q3-25 contracts. Data source: Nasdaq Commodities.

Appendix

Interpretation of the auction results

When participants submit their bids, the buy orders are sorted from the highest to the lowest bids, and the sell orders are sorted from the lowest to the highest bids. The highest price on the buy curve is referred to as the maximum buy price, and the lowest price on the sell curve is referred to as the minimum sell price, as shown in Figure 10. The volume at which the intersection occurs is referred to as the maximum volume. The intersection occurs at the last point where Statnett's buy price is equal to or lower than the sell price. In other words, it is the last point where the buy curve is higher than or equal to the sell curve. This is the maximum volume according to the auction criteria.

However, Statnett offers a specified volume for each contract and border, which can be found in the auction calendar.[1] If the maximum volume is higher than the offered volume, the marginal prices, i.e., the buy and sell prices for the contracts, will match the prices at the point for the offered volume. If the maximum volume is lower than the offered volume, the marginal prices will be the buy and sell prices at the point where the auction criteria are met.

Bid-to-cover ratio

As described in the Results section, the bid-to-cover ratio is a measure of oversubscription in the auctions and describes the relation between the accepted volume and the curves to the right of the marginal price. The bid-to-cover ratio is adjusted for the auction criteria, and is based on the maximum volume, not the last point on the curves. Hence, the bid-to-cover ratio is defined as:

$$bid - to - cover\ ratio = \frac{V_{max}}{V_{offered}}$$

Where V_{max} is the maximum volume according to the auction criteria, and $V_{offered}$ is the offered volume from Statnett.

From the example below in Figure 10, V_{max} is 135 MW, and $V_{offered}$ is 40 MW. Following the formula above, the bid-to-cover ratio is 3,375.

[1] Auction calendar: https://www.nordpoolgroup.com/49336b/globalassets/download-center/epad/statnett-epad-auction-calendar.pdf

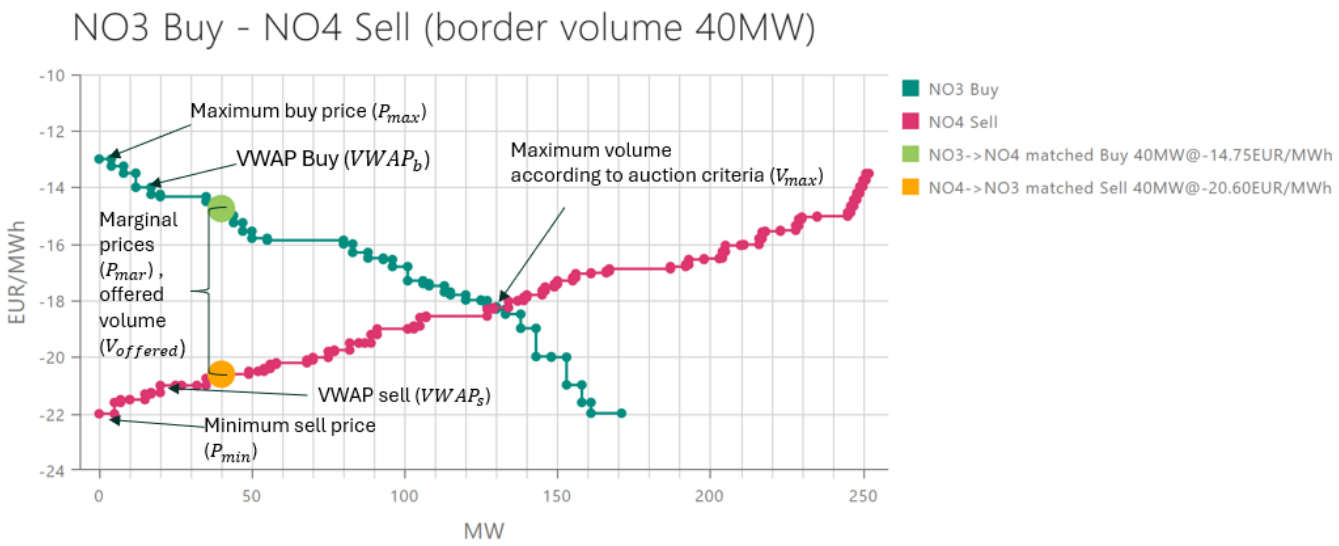

Figure 2: Illustration of result curves from the auction 03-04-2025 for the monthly NO3-NO4 contract. The curves can be found on Nord Pool's auction portal: https://data.nordpoolgroup.com/epad-auction/aggregated-bid-curves?auctionYear=2025&auctionDate=2025-03

Implicit price tails

As described in the Results section, implicit price tails describe the price formation to the left of the marginal price. As shown in Figure 10, the highest bid on the buy curve is referred to as the maximum buy price, P_{max}, and the lowest bid on the sell-curve is referred to as the Min sell price, P_{min}. One approach to describe the price formation is the difference between the maximum price on the buy curve and the marginal price.

Similarly, the same approach is used for the sell curve. However, here, the price formation to the left of the marginal price is described as the difference between the minimum price and the marginal price. To provide a more aggregated view of the price formation, the average long implicit price tail (LIPT) for the buy and sell curves for each contract and border is presented. Hence, the long implicit price tail is defined as:

$$LIPT = mean(abs(P_{max} - P_{mar_b}), abs(P_{min} - P_{mar\_s}))$$

Where P_{max} is the maximum price on the buy curve, P_{mar_b} is the marginal price on the buy curve, P_{min} is the minimum price on the sell curve, and P_{mar_s} is the marginal price on the sell curve.

One disadvantage of the long implicit price tail is that some participants might submit a very high or low bid to increase their probability of getting a trade. This will result in a high implicit price tail, even if the majority of the orders are relatively close to the marginal price. An alternative approach is the short implicit price tail (SIPT). The short implicit price tail uses the volume-weighted average for the curve to the left of the marginal price and could be a better way to measure the price formation, since all points on the curve are taken into account, rather than just the total price difference.

The volume-weighted average price is the sum of the volume multiplied with the price, divided by the matched volume. Hence, the short implicit price tail is defined as:

$$SIPT = mean(abs(VWAP_b - P_{mar\_b}), abs(VWAP_s - P_{mar_s}))$$

Where $VWAP_b$ is the volume-weighted average price for the buy curve, and $VWAP_s$ is the volume-weighted average price for the sell curve.

Table 1: Matching rules in the auction algorithm.

Scenario	Rule
One border; A profitable direction exists (buy low/sell high condition is met)	Auction realized
One border; No profitable direction exists (buy low/sell high condition not met)	Auction not realized
One border; Initial sell/buy price is not fulfilling the buy low/sell high condition	A match is made at a lower volume by reducing the buy/sell side
One border; Insufficient volumes on one side	The volume is adjusted equal to the unfulfilled volume
One border; Both directions are profitable	The most profitable direction is realized
One border; Both directions are equally profitable but one has higher volume	The direction with the higher volume is realized
One border; Orders with the same prices are entered	The matched volume is proportionally split based on the respective bid volumes, accounted for maximum matchable volume
Multiple borders; Insufficient volume to fulfil all borders	The borders without profit are left out of the result
Multiple borders; Multiple profitable borders but insufficient volume to fulfil all	The most profitable border is prioritized, and the remaining volume is matched with the second most profitable border, etc.
Multiple borders; Orders with the same prices are entered	The matched volume is proportionally split based on the respective bid volumes, accounted for maximum matchable volume

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