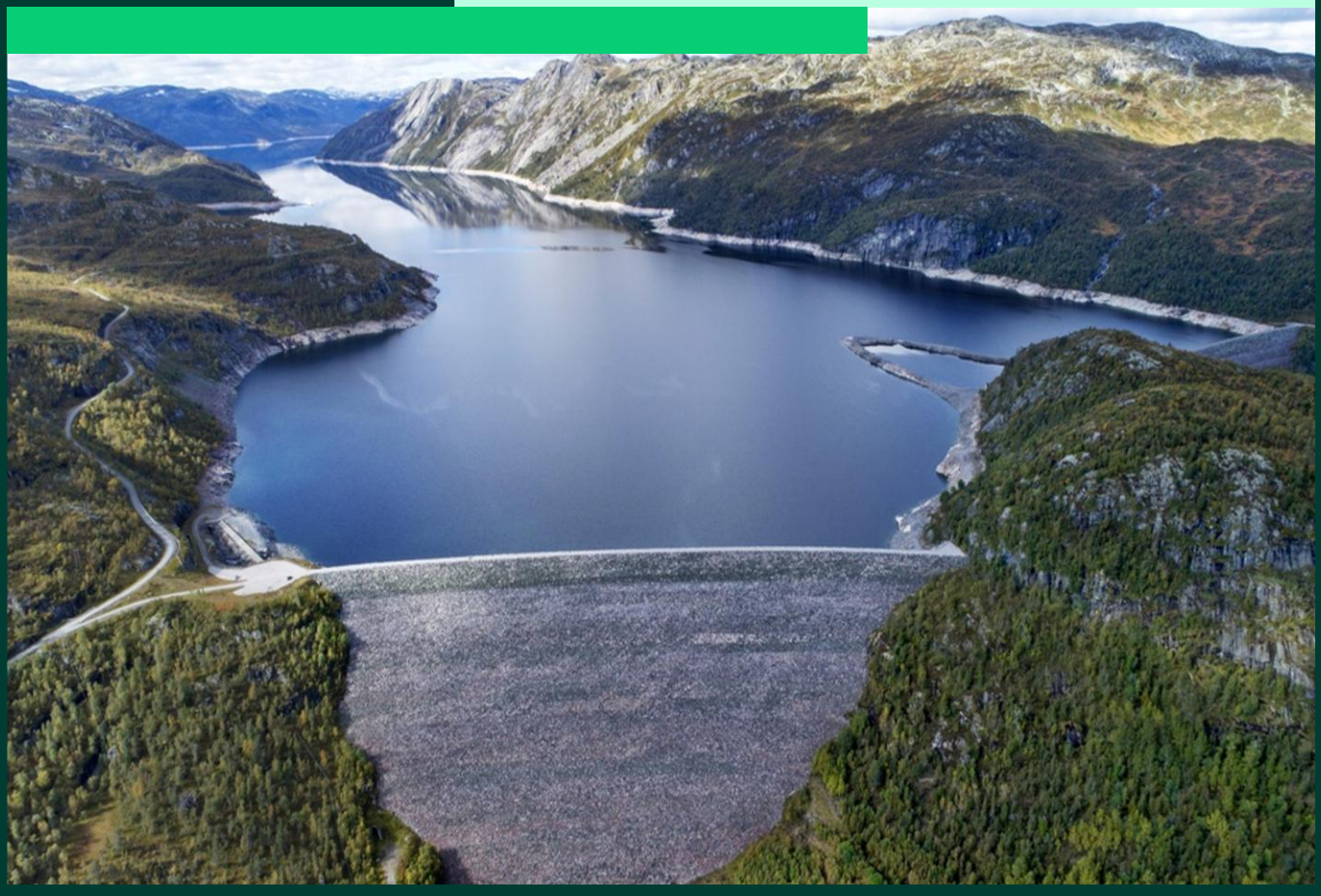
Statnett

Norwegian EPAD auctions 18-month report



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Introduction

This is the 18-month report presenting background, results and future for the Norwegian EPAD auctions[1]. The report provides insights into the auction outcomes, market trends and liquidity measures for 2025 and 2026, where the first and only auction in December 2024 is included. The cutoff date for the analysis period was 31.05.2026, close to 18 months after the first auction.

Background

The financial power market provides market participants with an opportunity to obtain standardized financial contracts to hedge their positions and reduce their financial risk. However, the liquidity in the Nordic financial power market has been declining over the last decade. This has caused increased price spread between buyers and sellers, indicating low and decreasing efficiency in the financial power market, making it harder to obtain contracts and limiting the value of contract prices as long-term price indicators.

The European Regulation (EU) 2016/1719, establishing a guideline on forward capacity allocation (FCA), has been adopted into Norwegian law and assigns a responsibility to TSOs to ensure the availability of sufficient price hedging opportunities for market participants. Accordingly, in February 2024, the Norwegian Energy Regulatory Authority (RME) issued a decision directing Statnett to explore alternative schemes to support price hedging in the Norwegian bidding zones. The decision was made under the authority of the Norwegian Energy Act § 10-1, and Article 30(5)(b) of the FCA regulation.

Separately, the Norwegian Ministry of Energy directed Statnett to conduct a pilot program for EPAD auctions in Norway. An EPAD is a futures contract that provides a hedge between the price in the respective bidding zone and the Nordic system price.

The motivation behind the pilot program was to assess whether EPAD auctions can enhance liquidity and price formation in the financial power market. In these auctions, Statnett offers to buy and sell EPAD contracts across adjacent bidding zones based on price-independent volumes. Specifically, Statnett will buy a volume on one side of a border and sell a corresponding volume on the other side of the border.

In August 2024, it was announced that Nord Pool had won the tender to manage the Norwegian EPAD pilot on behalf of Statnett. As a result, Nord Pool is responsible for organizing the auctions. The auction calendar, market rules, fee schedule and results are published on Nord Pool's website[2]. All transactions until March 2026 have been cleared by Nasdaq Clearing. From March 2026, clearing is shifted to Euronext Clearing. The transition has gone well, without any major issues. Euronext has engaged market makers in all Nordic areas, which are setting a closing price on a daily

[1] Electricity Price Area Differential (EPAD)
[2] Nord Pool's EPAD portal: https://www.nordpoolgroup.com/en/trading/epad-auctions/

basis. Euronext also has a different model for the margin requirement, now using a VAR model instead of the previous SPAN model. This has resulted in a reduction of the margin requirements for the participants.

The pilot officially commenced on December 10, 2024, and shares many similarities with the ongoing Swedish pilot conducted by Svenska Kraftnät, which began in February 2023.

In a decision in 19 of March 2025, RME, the Norwegian Regulator concluded that the EPAD pilot program should be a permanent solution in Norway, and in effect from 19 of March 2026.

Hedging need and opportunities

The spot price varies between the Norwegian bidding zones where transmission constraints cause prices to diverge between them. Price formation in the forward market provides an important indication of how the market assesses future price developments in different bidding zones. Thus, forward prices also reflect the size and distribution of congestion revenues accruing to TSOs. For internal Norwegian bidding zone borders, congestion revenues accrue to Statnett, while revenues on external borders are shared between the respective interconnector owners, most commonly TSOs.

Trading in financial power derivatives on the forward market is widely used across Europe as a complement to spot market trading and serves as a key instrument for hedging price risk. Through standardized contracts traded at regulated marketplaces, such as Nasdaq or EEX, buyers and sellers can lock in a fixed electricity price for a defined delivery period. An important advantage of exchange-traded derivatives is the high degree of transparency and the requirement that all counterparties are approved and cleared through the exchange, ensuring creditworthiness and mitigating counterparty risk.

System price and EPAD contracts in the Nordic market

In the Nordic power market, a different structure of standardized financial contracts is used compared to most other European markets. Rather than zonal futures combined with transmission rights, Nordic market participants primarily hedge price risk using system price contracts (SYS), supplemented by EPAD contracts.

The Nordic system price is a reference price calculated as if electricity could be traded without transmission constraints across the Nordic area. System price contracts allow market participants to hedge a large share of the fundamental price risk in the power system such as hydrological conditions, wind production, and fuel prices.

However, system price contracts do not hedge the remaining price risk arising from differences between the system price and the price in a specific bidding zone. This risk has become increasingly important in Norway, as bidding zone prices have diverged significantly since 2021. EPAD contracts address this gap by providing a financial hedge for the price difference between a specific bidding zone price and the Nordic system price.

By combining a system price contract with an EPAD contract for the relevant bidding zone, market participants can achieve an effective hedge against both system-wide price risk and local bidding zone price

risk. As price spreads between the Norwegian bidding zones have increased, this combination of system price and EPAD contracts has gained greater importance for achieving a more comprehensive and effective hedge.

EPADs, bidding zone spreads and relevance for Norway

Although EPAD contracts are designed to hedge the deviation between a bidding zone price and the system price, they can also be combined across bidding zones. A position consisting of buying an EPAD in one bidding zone and selling an EPAD in another bidding zone is financially equivalent to hedging the price difference between the two bidding zones directly. While such combinations have limited application for most market participants, they are relevant to TSOs. When a TSO engages in the financial market, paired EPAD positions across adjacent bidding zones act as a partial hedge against congestion income exposure.

The Norwegian EPAD auctions is therefore motivated by factors from both a market and a system perspective. From a market perspective, the auctions aim to improve liquidity and price formation in EPAD contracts, thereby strengthening hedging opportunities for market participants. From a system perspective, EPAD auctions supports a more robust and transparent financial framework for managing the increasing price differentials between Norwegian bidding zones that have emerged in recent years.

Observed in Figure 1, the decline for the Nordic financial market has been severe since 2013. In previous years, the Norwegian bidding zones experienced very similar prices, and the SYS contract worked well as proxy hedging product. However, the prices in Norway started to diverge in 2021. This was due to a combination of the emerging energy crisis with rising gas prices, new interconnectors in Southern Norway, and a hydrological strong surplus in the north combined with a large deficit in south of Norway. With high price spreads between the Nordic bidding zones, the SYS volumes reached bottom in 2022.

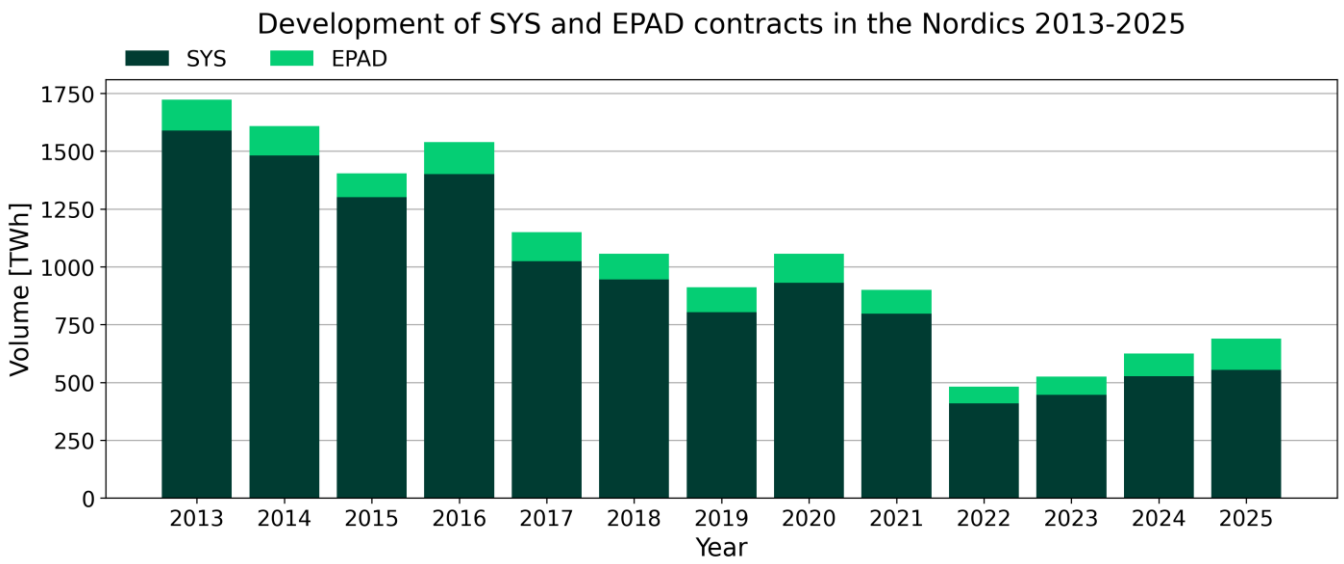

Figure 1: Development of SYS and EPAD contracts in the Nordics from 2013 to 2025. The total for SYS contacts includes figures from both Nasdaq and EEX. SYS contracts for Norway only includes figures from Nasdaq.
Data source: Nasdaq Commodities and EEX.

There has been a steady rise in the Nordic financial market since then, and 2025 was the year with the highest total volume since 2021 with 563 TWh[3]. This is an increase of 4 percent since 2024, when 540 TWh was cleared. This included volumes from both Nasdaq and EEX. The main reason is the increased EPAD volumes from the EPAD auctions in Norway and Sweden. The EPAD volume in Norway has increased from 12 TWh in 2024 to 33 TWh in 2025. This is by far the highest EPAD volume in Norway during this 13-year period, as seen in Figure 2. In Sweden, the EPAD volumes increased with 12 TWh, to 70 TWh. With higher price spread between the bidding zones in Norway, a combination of SYS + EPAD has gained more importance the latest years to obtain an effective hedge.

[3] This includes cleared volumes at Nasdaq and EEX. The joint webinar with Nord Pool and other external reports have often only included figures from Nasdaq. This is the why the increase is 4 percent, and not 5 percent as presented in other reports and webinars.

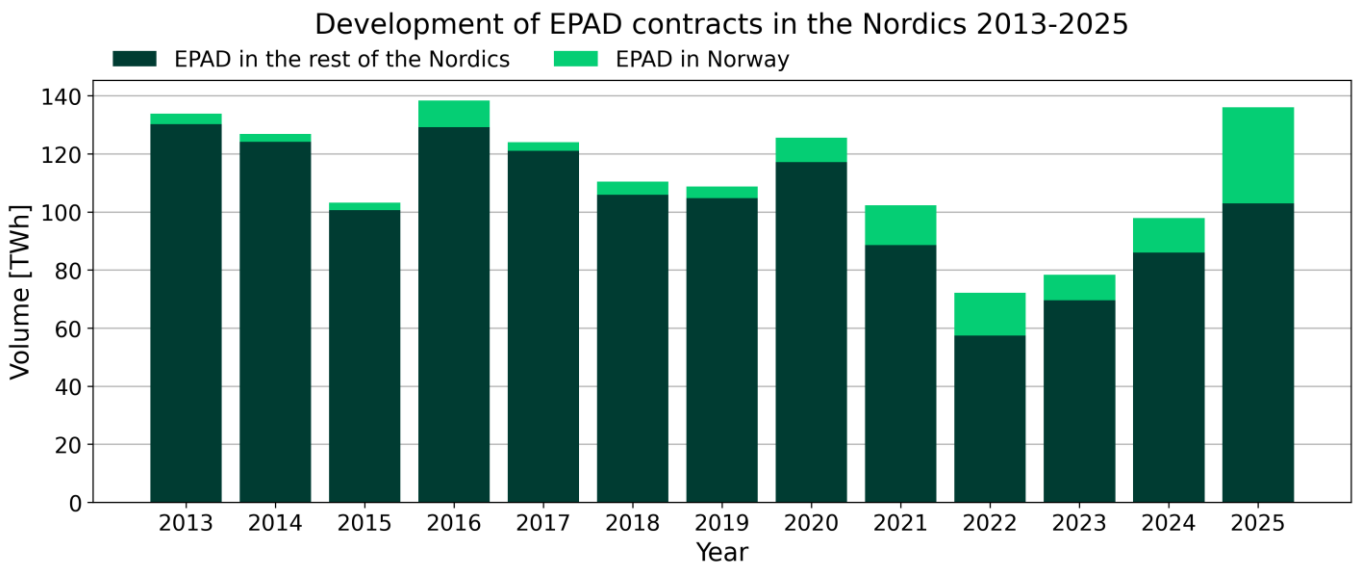

Figure 2: Development of EPAD contracts in the Nordics from 2013 to 2025. Data source: Nasdaq Commodities.

2025 is the year with second highest EPAD volumes across the Nordics, with 136 TWh. This is 2 MW lower than the previous high in 2016.

EEX introduced zonal futures by the end of Q1 2024, a product which can be considered as a combination of an EPAD contract and a SYS contract, complimenting the existing hedging products in the Nordics. The volumes have so far been low in the Nordics compared to EPAD contracts, with 3 TWh in 2024 and 2025 respectively. The bidding zones with the highest activity are DK1 and SE3. No volumes were traded in Norway until Q4 2025. However, the introduction of market makers in the Norwegian bidding zones resulted in more liquidity and cleared volumes after this.

Figure 3: Map of Norwegian bidding zones and borders included in the auctions.

The included borders in the auctions are NO1-NO2, NO1-NO5 and NO3-NO4 as seen in Figure 3. The contract types include monthly, quarterly and annual contracts. Auctions, which are held every Tuesday in even weeks, will only be concluded if Statnett's buy price is equal to or lower than the sell price in the adjacent bidding zone.[4] The transmission grid in Norway is heavily affected by bottlenecks, resulting in significantly lower available physical capacity compared to Sweden. To mitigate risk, Statnett offers volumes of approximately 10-20 percent, corresponding to 200-250 MW of the transmission capacity for each bidding zone border, distributed across the three contract types. The three included borders have highest capacity among the six internal borders in Norway, which was the main reason for the inclusion of these borders in the auctions. This also allowed all bidding zones to be included in the auctions, strengthening the hedging opportunities in all bidding zones.

[4] Matching criteria:
https://www.nordpoolgroup.com/4ad1ed/globalassets/download-center/epad/statnett-epad-auction---market-rules.pdf

Auction efficiency

There are several methods for measuring liquidity and efficiency of auctions. Common indicators typically include participation, volume and price-formation. This report also examines the bid-to-cover ratio, implicit price tails and friction costs. Together, these measures provide an elaborate indication of liquidity and efficiency of the auctions.

Participation

The number of companies participating in the auctions is a good measure of liquidity. More participants result in higher participation and more volume. The first auction in the pilot was conducted on December 10, 2024, with 21 participants. As shown in Figure 4 below, each auction had between 16-24 participants, with an average of 20 participants per auction. Observed in the survey further below in the report, there are a mix of producers, electricity retailers and traders participating in the auctions. Furthermore, there is a mix of companies from Norway, other Nordic countries and continental Europe participating in the auctions. More than thirty companies have participated at least once in the auctions. Observed from the trend line, participation in the auctions has been stable during the period. The last auction resulted in a slightly negative trend, which also had the lowest number of participants during the auction period. On the other hand, the highest number of participants in an auction occurred two auctions prior to this.

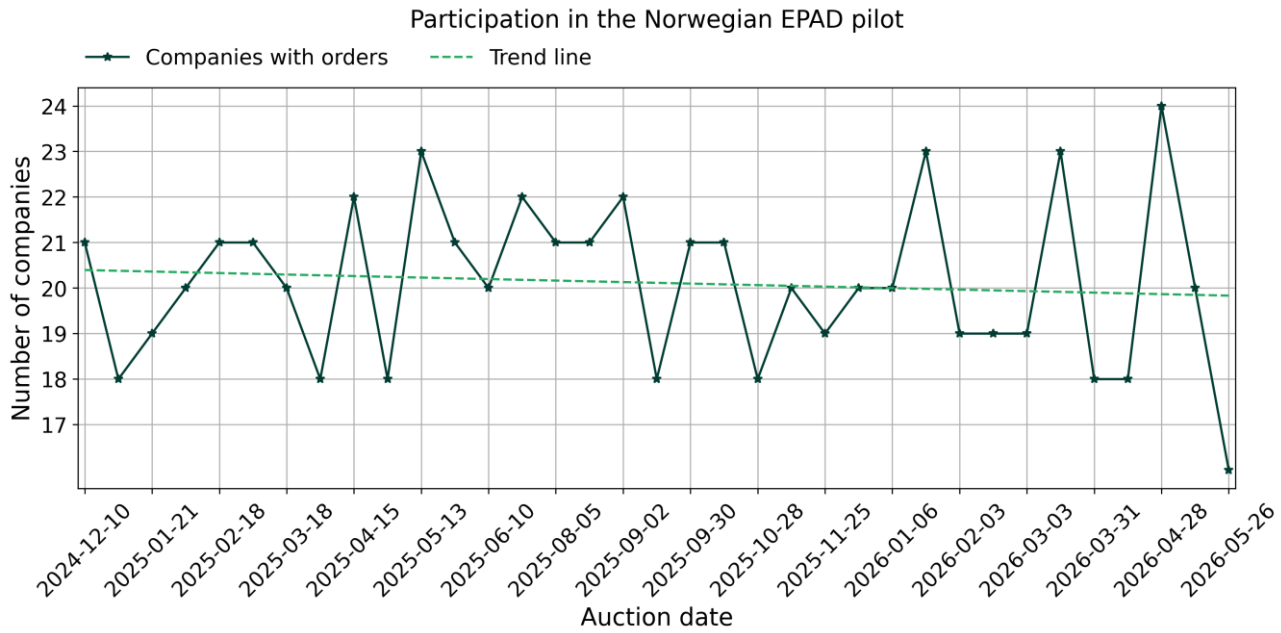

Figure 4: The number of individual companies placing orders in each auction. Data source: Nord Pool.

Accumulated volumes

Statnett intended to offer 200 – 250 MW in each auction. Statnett has offered a volume of 10-40 MW for the monthly contracts, 10-20 MW for the Q+1 contracts, 10 MW for the Q+2 contracts, and 5 MW for the annual contracts in each auction. With an increasing number of auctions, Statnett's position accumulated from the annual and quarterly contracts, while the offered volume for the monthly contracts gradually decreased. More information about this can be found in the auction calendar.[5] The volumes have been sold out in most of the auctions, with a few exceptions for the monthly and quarterly contracts. The annual contracts have been sold out in all auctions.

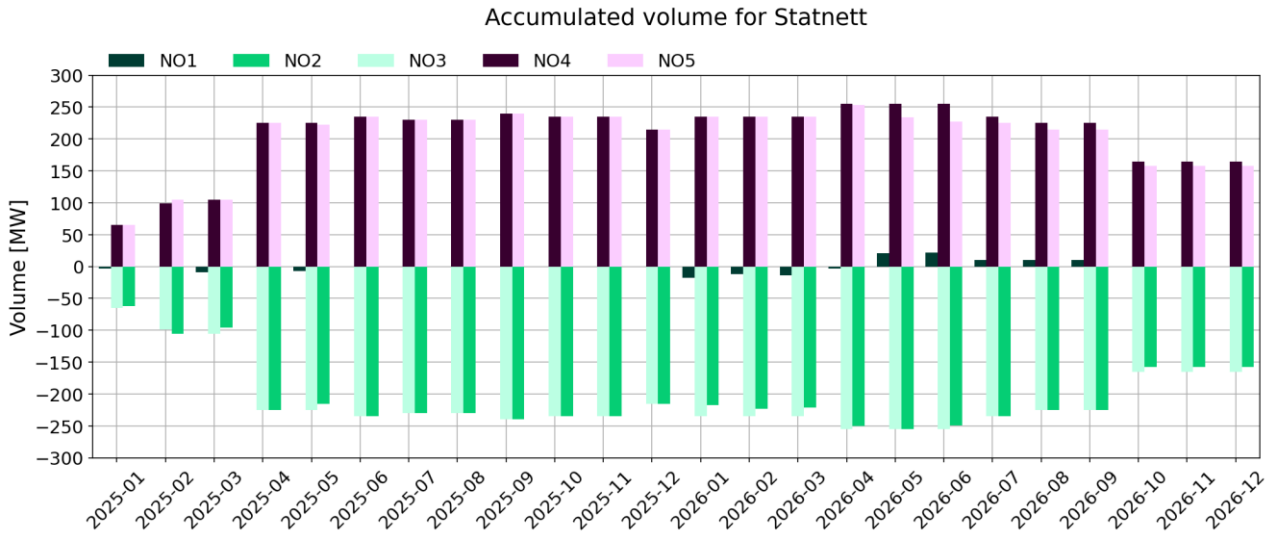

Figure 5: Accumulated volume for Statnett for all bidding zones in the EPAD auctions. Data source: Statnett.

In all auctions for the NO1-NO2 border, Statnett has so far obtained a buy position in NO1 and a sell position in NO2. In the auctions for NO5-NO1, the results are opposite, where Statnett usually obtains a sell position in NO1 and a buy position in NO5. This results in netted positions in NO1 for Statnett, which gives a friction cost each time the buy-price exceeds the sell-price in NO1. As such, the NO1 positions have been netted in most of the auctions, so far resulting in a positive friction cost for Statnett. The small bars observed for NO1 in Figure 5 represent months where the offered volume was not sold out in NO1, with no complete netting of the positions. An exception for the buy position in NO5 occurred for the auctions in April 2026, where Statnett obtained a buy position in NO1 for both borders for the MJUN-2026 contract. The main reason for this was an unusually weak hydrological balance in NO5, with a deficit of 5-6 TWh in this period. For the NO3-NO4 auction, the outcome has been a buy position in the surplus area NO4, and a sell position in NO3.

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

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.

The volumes remained low during 2023 and the first half of 2024. However, an increase was observed in autumn 2024, a few months before the first EPAD auction on 10 December as seen in Figure 6. Mentioned previously, the total EPAD volumes in Norway rose from 11,9 TWh in 2024, to 33,0 TWh in 2025. This corresponds to an increase of 179 percent. The continuous market had a volume of 10,9 TWh in 2024, which increased to 15,6 TWh in 2025. This corresponds to an increase of 42 percent. The auctions may have contributed to this increase in the continuous market, in addition to a strong increase in the total volumes. During 2025, no auctions were conducted in July, which resulted in a lower total volume in Q3 compared to Q1 and Q2. The total volume was 7,6 TWh and 7,2 TWh in Q3 and Q4 respectively, compared to 9,4 and 8,9 in Q1 and Q2. In Q1 2026, the volume was 8,0 TWh. The monthly volumes for all Norwegian bidding zones can be observed in the bottom-right plot in Figure 6.

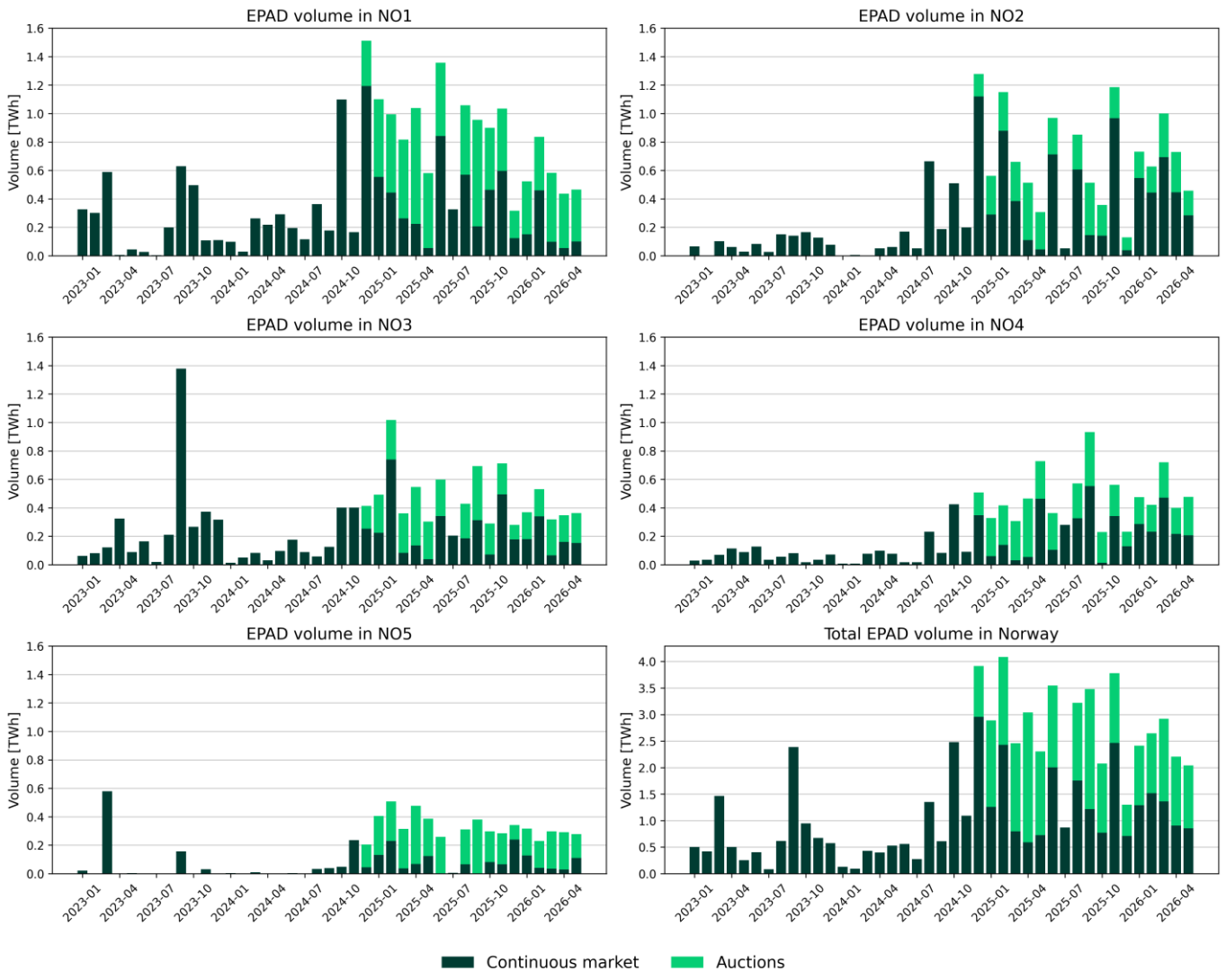

Figure 6: Monthly EPAD volumes in each Norwegian bidding zone, with the total EPAD volume for the bidding zones in the bottom-right plot. The timeframe ranges from 01.01.2023 to 31.05.2026. Data source: Nasdaq Commodities.

NO1 is the area with the highest volume in 2025 with 32 percent of the total EPAD volume in Norway. This was also the case in 2024. Of a total of 10,5 TWh, 5,8 TWh was traded in the auctions observed in Figure 6. Fundamentally, NO1 is a deficit area with high consumption. It has also a high share of run-of river hydro in the production mix, further increasing the hedging need. Furthermore, NO1 is included in two of the borders as the only bidding zone, NO1-NO2 and NO1-NO5. Following this, the volume in NO1 is higher in the auctions because of the auction design. Hence, the other areas experienced a volume of 2.9 TWh coming from the auction design, since the volume offered was sold out in most of the auctions.

NO2 is a surplus area, with a very high share of flexible hydropower. Simultaneously, NO2 has simultaneously been the bidding zone with the highest prices in Norway the last years, resulting in a hedging need particularly for the consumption side. NO2 experienced the second highest volume in 2025, with 7,3

TWh, compared to 3,18 TWh in 2024. The continuous market rose from 3,0 TWh in 2025 to 4,4 TWh in 2025 seen in Figure 6.

Like NO1, NO3 is also usually a deficit area. This bidding sone has the highest share of wind power in Norway, which gives a hedging need for irregular wind production. Furthermore, both NO3 and NO4 experienced very strong hydrology by the end of 2024 and most of 2025, pushing the day-ahead prices down. This has most likely increased the need for hedging production in this area. The total EPAD volume was 5.9 TWh, compared to 1,9 TWh in 2024. This corresponds to an increase of 205 percent. The volumes in the continuous market rose from 1,8 TWh in 2024 to 3,0 TWh in 2025.

NO4 is a surplus area, with an average day-ahead price of 9 EUR/MW in 2025 because of the very strong hydrology, with the highest hydro reservoir levels observed over more than 20 years for most of the year. This may have impacted the hedging need for production in this area, both for hydro and wind power. The total volume increased from 1,6 TWh in 2024 to 5,4 TWh in 2025.

NO5 is a surplus area in Southern Norway in addition to NO2, where most of the production is flexible hydro power. This is the only bidding zone in Norway with no installed wind power. Hence, there is a very limited hedging need from irregular production. The volumes in this area have been very low before the introduction in the auctions, with only 0,4TWh in the continuous market during 2024. This has more than doubled to 1,1 TWh in 2025, but it is still low. With this limited volume in the continuous marked, the auctions have contributed to an increase of almost 600 percent, to 4,0 TWh. The auctions have a very strong impact on the liquidity in this area, but primarily for the sell-side so far in the auctions.

Interpretation of the action 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 7. Hence, an intersection will usually occur. The volume at which the intersection occurs is referred to as the marginal 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. The auction results with the bidding curves are found at the Nord Pool platform[6].

However, Statnett offers a specified volume for each contract and border, which can be found in the auction calendar.[7] 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

[6] Nord Pool | EPAD Aggregated Bidding Curves
[7] https://www.nordpoolgroup.com/49336b/globalassets/download-center/epad/statnett-epad-auction-calendar.pdf

lower than the offered volume, the marginal prices will be the buy and sell prices at the point where the auction criteria are met.

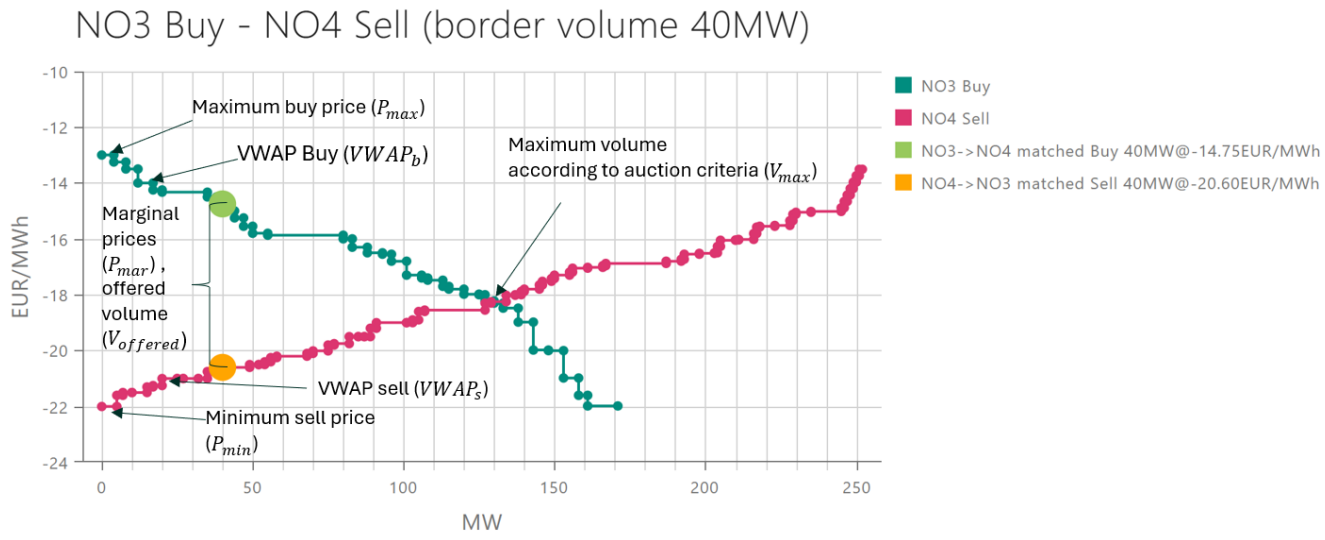

Figure 7: Snapshot of the bidding curve from the auction result 04.03.2025 for the monthly APR-25 contract for NO3-NO4, with description of parameters used for calculation of auction efficiency. Data source: Nord Pool.

Bid-to-cover ratio

The bid-to-cover ratio is an approach to measure the strength of demand, or stakeholder interest, in auctions. As such, the metric aims at describing "oversubscription" in an auction, where oversubscription is determined based on the *buy low-sell high* auction criterion. High bid-to-cover ratio will often correlate with high liquidity.

The bid-to-cover ratio is the maximum volume that can be matched in each auction fulfilling the criterion, divided by the volume offered by Statnett. Thus, the bid-to-cover ratio is also impacted by Statnett's decisions on capacity, and the bid-to-cover ratio is calculated from the auction criteria, and not the full bidding curves. A high bid-to-cover ratio, which indicates strong interest, would therefore also point towards high liquidity in the auctions. 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 above in Figure 5, V_{max} is 135 MW, and $V_{offered}$ is 40 MW. Following the formula above, the bid-to-cover ratio is 3,375.

Figure 8: 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. Data source: Nord Pool

Figure 8 shows that the bid-to-cover ratio is lower for the monthly contracts compared to the annual and quarterly contracts across all borders, with a few exceptions where the monthly contract has the highest bid-to-cover ratio for NO3-NO4 in 2026. One reason for this is that the volume offered for the monthly contracts has been higher than for the quarterly and annual contracts. A limitation of the bid-to-cover ratio is that it changes based on the offered volume. With lower offered volume from one auction to another and the offered maximum volume remains equal, the bid-to-cover ratio increases. The bid-to-cover ratio has been stable for the annual contracts, but an increase is observed for the monthly contracts for all borders combined, partly because of the reduced offered volume. Nevertheless, with lower offered volume, the participants will often adjust the bidding behavior, submitting lower volume for each contract in order to avoid having a strong impact on the auction price.

For NO1-NO2, the development for the annual contract has been stable, with a strong decline for the quarterly contracts. Over the full period, the trend has been an increase for the monthly contracts, with a strong decline the last auctions of 2025. This reflected an expectation of similar prices between NO1 and NO2 for the beginning of 2026. A bid-to-cover ratio of less than 1 means that the offered volume was not sold out for the specified contract. The trend has been a decline for all NO1-NO5 contracts, which is particularly evident in 2026. For the NO3-NO4 border, the bid-to-cover ratio has increased for the monthly and quarterly contracts. During the last six months, the bid-to-cover ratio for NO3-NO4 has often been around 3-5.

Implicit price tails

Another implicit way to describe liquidity and price formation in auctions, is market depth measured by "implicit price tails". While bid-to-cover describes the liquidity in terms of oversubscription of volumes and market interest, this approach focuses on price formation for the buy and sell curves. Specifically, implicit price tails look at the difference in price spread at the marked clearing point, and at some other reference points on the bid and ask curves. Low implicit price tail indicates good market depth, meaning the marginal bid/volume cannot move the market much, and thus high liquidity in the auction.

There are two different types of implicit price tails presented in this report: Long implicit price tails and short implicit price tails. A long implicit price tail describes the absolute price difference between the highest or lowest price on the buy or sell curve and the marginal price at the market clearing point. For the short implicit price tail, the volume-weighted average price (VWAP) is used instead of the lowest or highest price. The average of the two tails is presented for each boarder and contract.

Implicit price tails describe the price formation to the left of the marginal price. As shown in Figure 7, the highest bid on the buy curve is referred to as the max buy price P_{max}, and the lowest bid on the sell-curve is referred to as the minimum 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 long implicit price tail, even if most 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 calculation uses the volume-weighted average for the curve to the left of the marginal price and is normally considered a better way to measure market depth in 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.

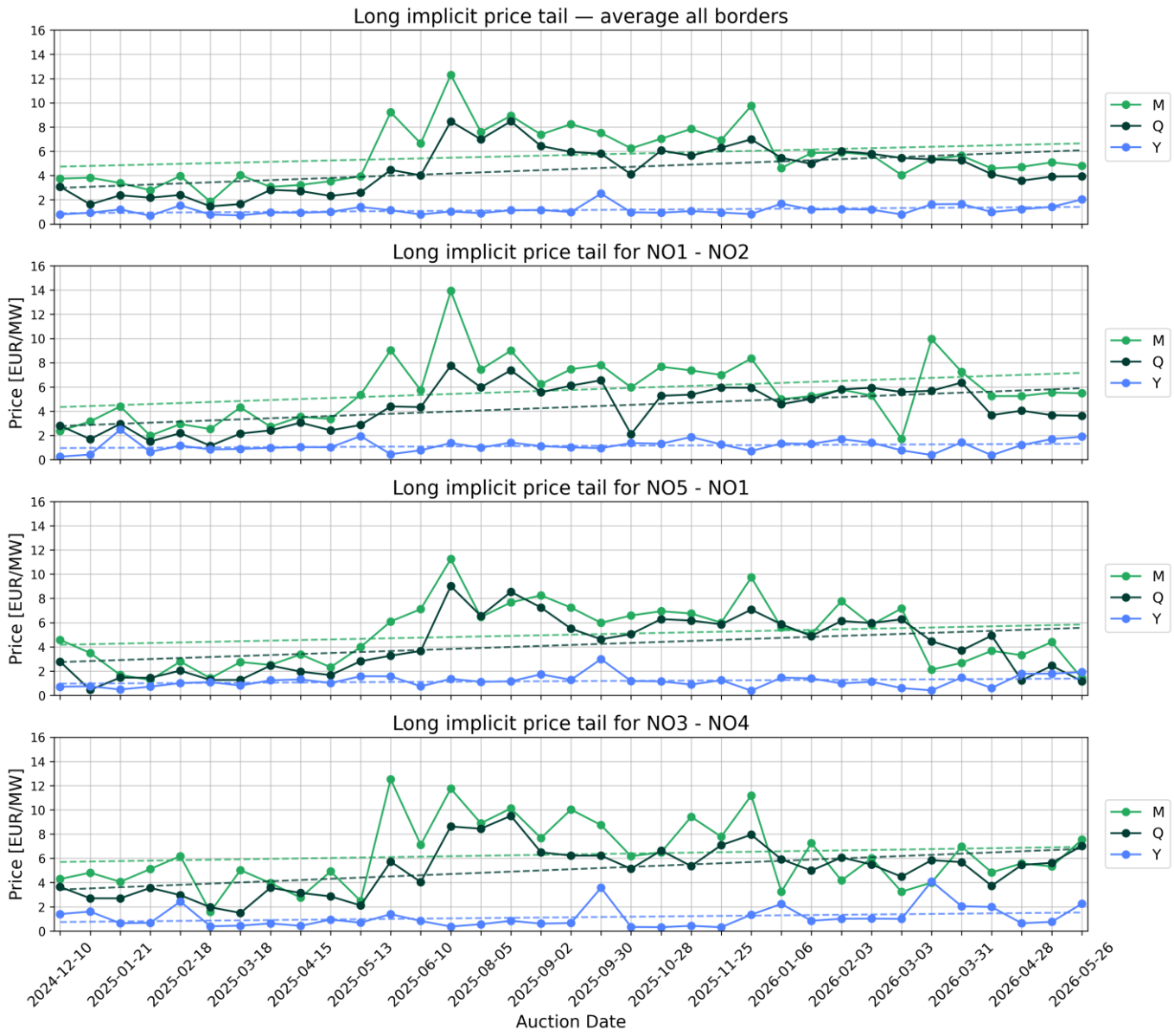

Figure 9: Long implicit price tail per monthly (M), quarterly (Q) and annual (Y) contract for all borders, and the average for all borders combined to the top of the plot. Data source: Nord Pool.

Observed in Figure 9, the long implicit price tail has been very stable for the annual contracts, around 1 EUR/MW per auction. This represents a small spread to the left of the curve, and satisfactory price efficiency. However, the quarterly and monthly contracts behave differently. During the initial months of the pilot, the long implicit price tail often trended at 2-4 EUR/MW for the different contracts as seen in Figure 9. However, this trend changed in May 2025, with much higher spreads for the monthly and quarterly contracts. This has often been a result of 1-3 MW on both sides of each border to the left of the curve, indicating tactical bidding to secure volume in the auctions. The result of this was an average long implicit price tail of 12 EUR/MW for all borders combined for the monthly contract as observed in the upper subplot in Figure 9. After May 2025, the level has been higher for the monthly and quarterly contracts, usually 6 – 10 EUR/MW.

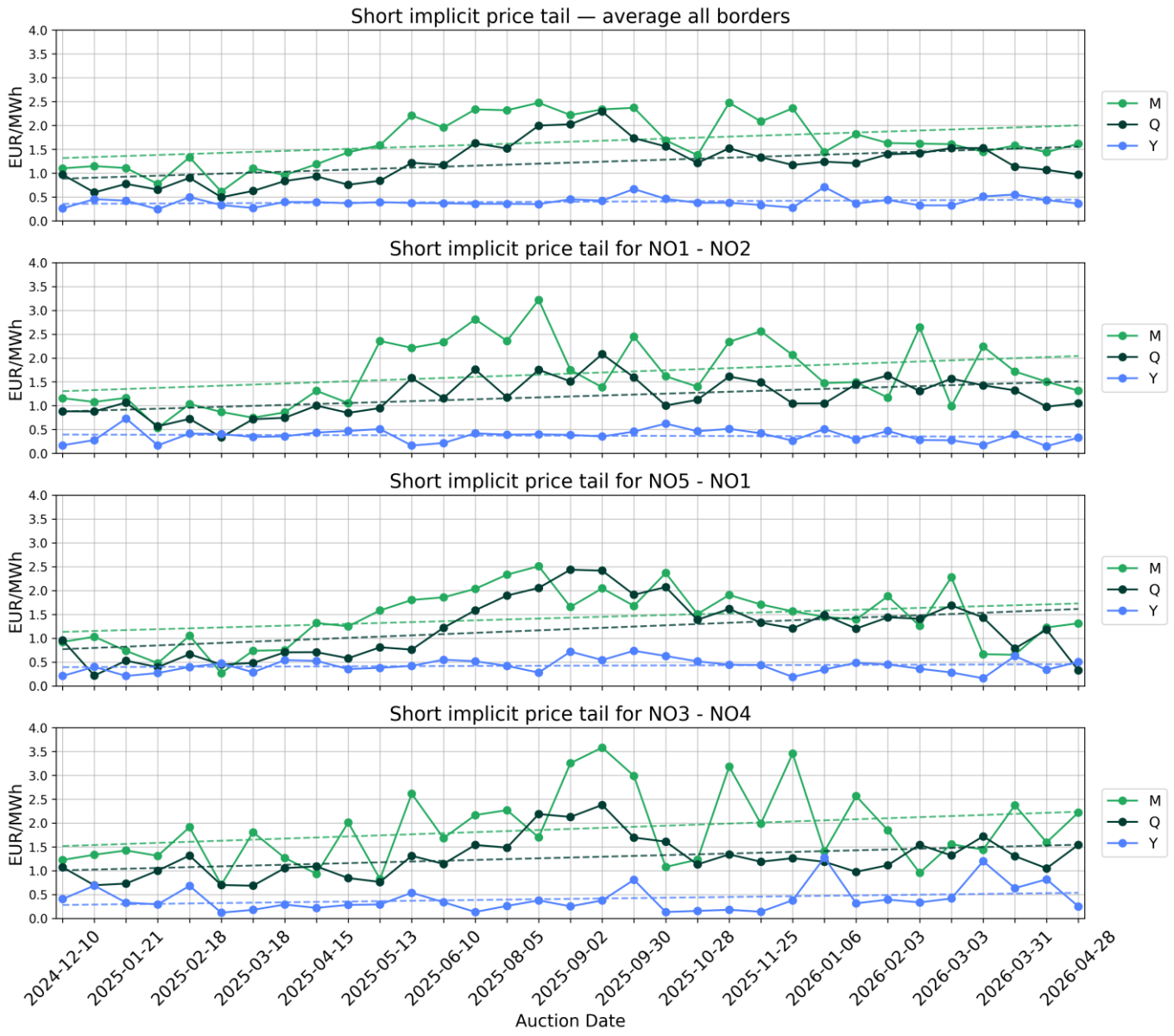

Figure 10: Short implicit tail per monthly (M), quarterly (Q) and annual (Y) contract for all borders, and the average for all borders combined. Data source: Nord Pool.

Figure 10 shows that the yearly contracts are very stable for the short implicit price tails across all borders. However, an increase for the monthly and quarterly contracts is observed from May 2025 and onwards. This is particularly evident for NO1-NO2. The tactical bidding behavior described for the long implicit price tail affects the short implicit price tail to some degree, particularly when the volumes were reduced for the monthly and quarterly contracts at the end of the year.

Friction cost

Mentioned previously, Statnett offer to buy and sell EPAD contracts in all the Norwegian bidding zones. The auctions are matched, where Statnett obtaines a buy position on one side of the bidding zone, and a sell position on the other side. According to the auction rules, the buy price is the same or lower than the sell price in the adjacent bidding zone. In the current auction design, NO1 contracts are offered on two borders, NO1-NO5 and NO1-NO2. For all auctions in 2025, the result has been a buy position in the surplus area NO5, and a sell position in the deficit area NO1. The opposite situation has occurred for NO1-NO2, where Statnett obtains a buy position in NO1, and a sell position in NO2. The participants submit separate orders for all borders and contracts. In a perfect market, the price in NO1 for will be identical for both borders. Mentioned previously, the direction for NO1-NO5 has shifted a few times for monthly contract.

As a result, a price difference will often occur between the NO1 buy and NO1 sell contracts. This unit price difference multiplied with the volume for the contract is referred to as a frictions cost. Friction costs can thus be considered a measure of liquidity, and price efficiency. High friction costs indicate low liquidity and poor price formation. Ideally, friction costs should be as close to zero as possible.

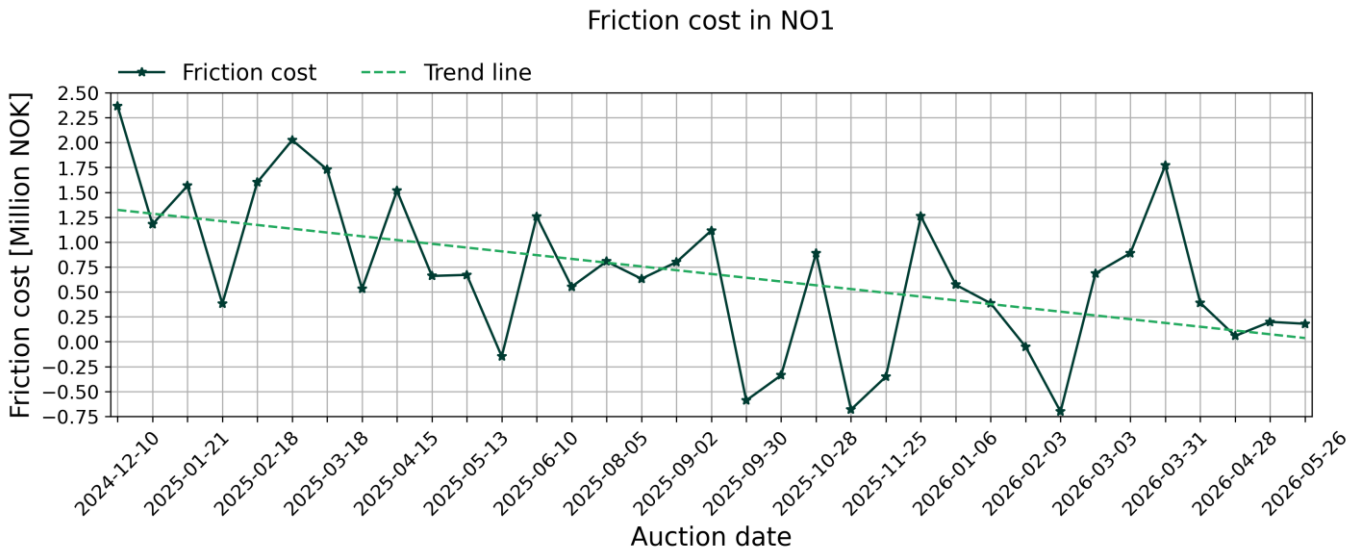

Figure 11: Friction costs in NO1 from the borders NO5-NO1 and NO1-NO2 for each action. Data source: Statnett.

The friction costs were relatively high during the initial phase of the auctions, where the highest friction cost also occurred in the first auction. The friction costs have declined during the first year of operation as seen in Figure 11, from an average of 1,55 million NOK during Q1, to 0,155 million NOK on average during Q4. For 2026, the result was 0,21 million NOK in Q1 and 0,52 million NOK so far in Q2. This indicates that the liquidity and price efficiency in the auctions have improved during the period.

Closing price and auction price

As mentioned previously, the liquidity in the continuous EPAD market has been low for many years, but an increase was observed in autumn 2024. As a result, the auction price usually sets the price in the continuous market. The closing prices for the EPAD contracts shown in the plots are relative to the system price.

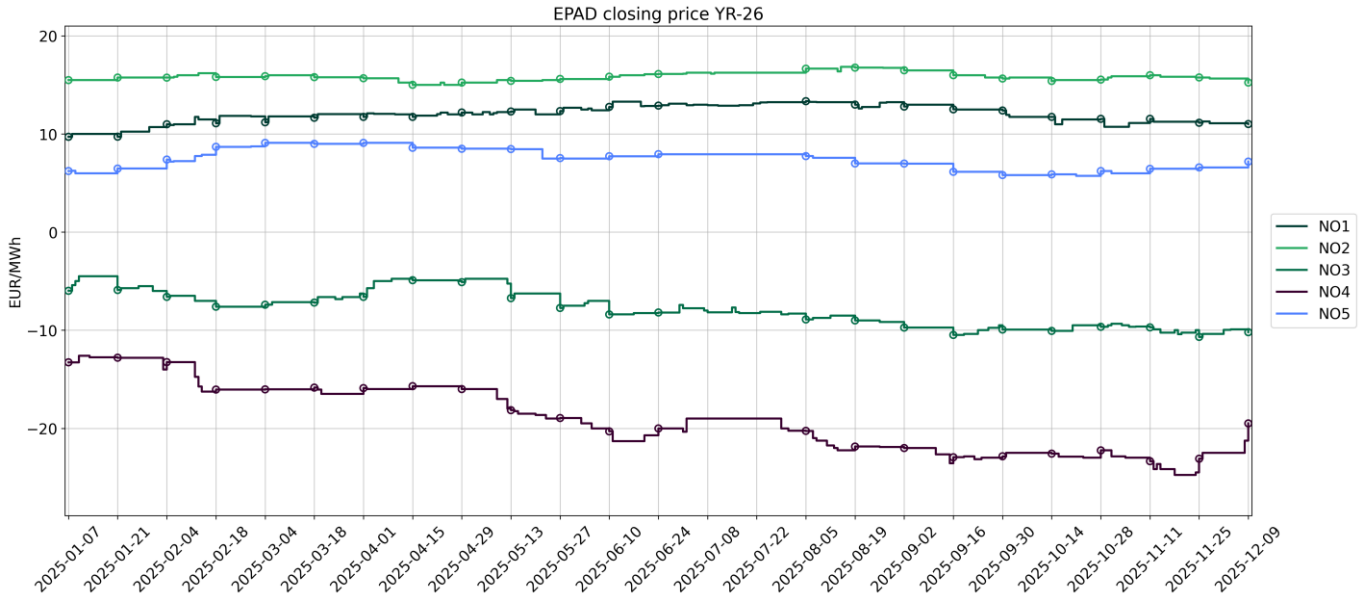

Figure 12: Closing price and auction price for the YR-26 contracts. Data source: Nasdaq Commodities.

As observed in Figure 12, the prices in the EPAD auctions usually establish the price level in the continuous market for the following trading days. This is particularly evident in the bidding areas for southern Norway (NO1, NO2 and NO5). In the northern areas, the closing price in the continuous market changes more rapidly. The northern areas experienced a strong hydrological surplus during most of 2025, which is reflected in the EPAD prices.

Figure 13: EPAD closing prices for the Q+1 contract in all Norwegian bidding zones. The dots represent the timing of the auctions. The shading represents the quarters in 2025. Data source: Nasdaq Commodities.

Both Q+1 contracts and Q+2 contracts are offered in the auctions. In Figure 13, the Q+1 contracts are merged based on the auction period. Hence, during the first quarter in 2025 from 2025-01-01 to 2025-03-31, the Q2-25 contract is plotted. Thus, four different contracts are represented in Figure 13, from Q2-25 to Q1-26. This is the reason why a clear shift in the price is observed for some of the areas.

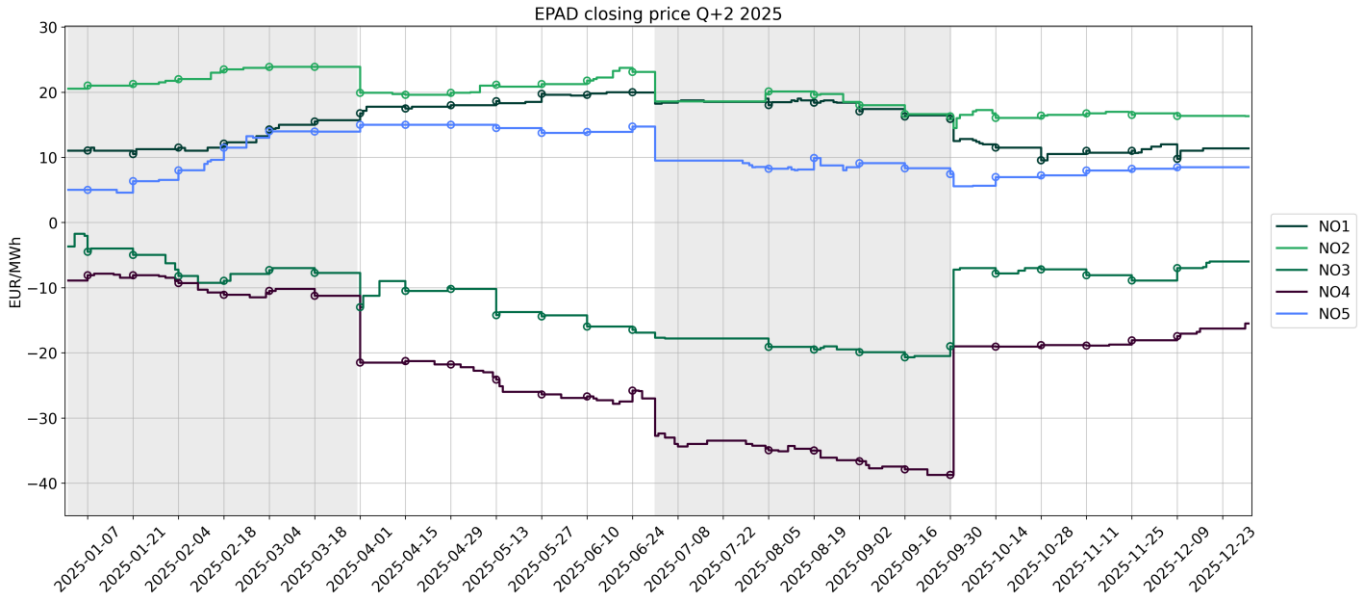

Figure 14: EPAD closing prices for the Q+2 contract in all Norwegian bidding zones. The dots represent the timing of the auctions. The shading represents the quarters in 2025. Data source: Nasdaq Commodities.

Figure 14 follows the same approach as Figure 14 for the Q+2 contract. The price change is even more evident for these contracts, which can be explained by a longer trading period before the contract is settled.

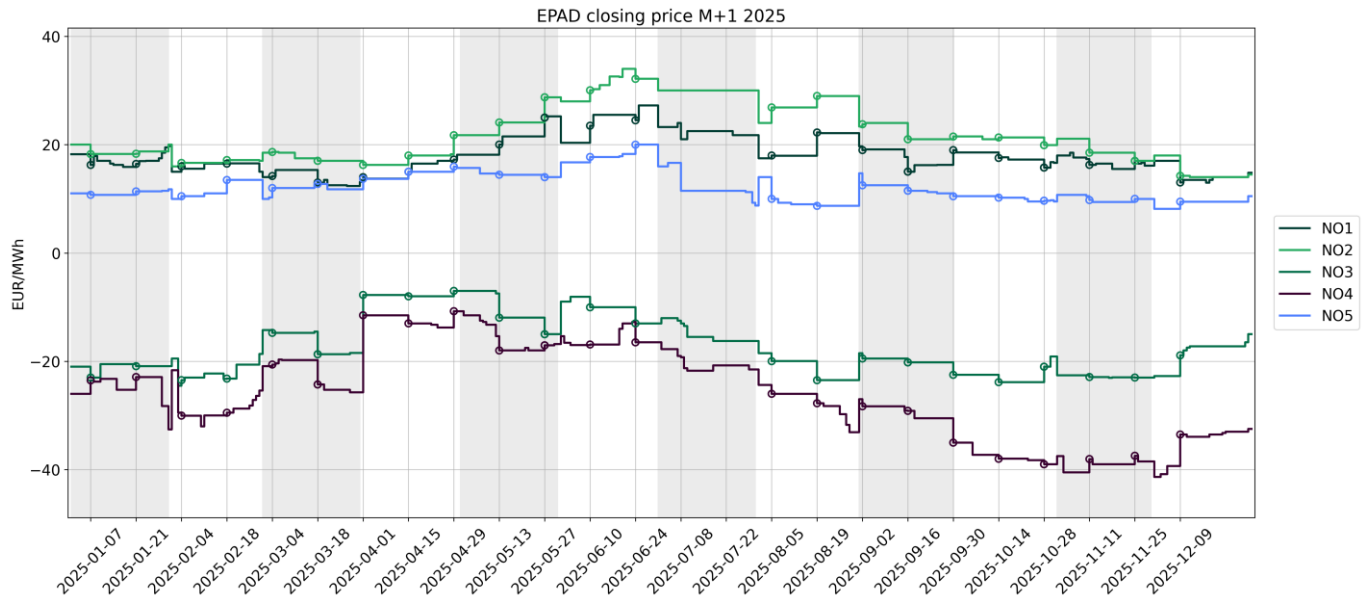

Figure 15: EPAD closing prices for the M+1 contracts in all Norwegian bidding zones. The dots represent the timing of the auctions. The shading represents the calendar months. Data source: Nasdaq Commoditites.

The M+1 contracts are shown in Figure 15. It can also be observed that the price shifts more frequently for these contracts, indicating higher liquidity. This is particularly evident for the continuous market in NO4.

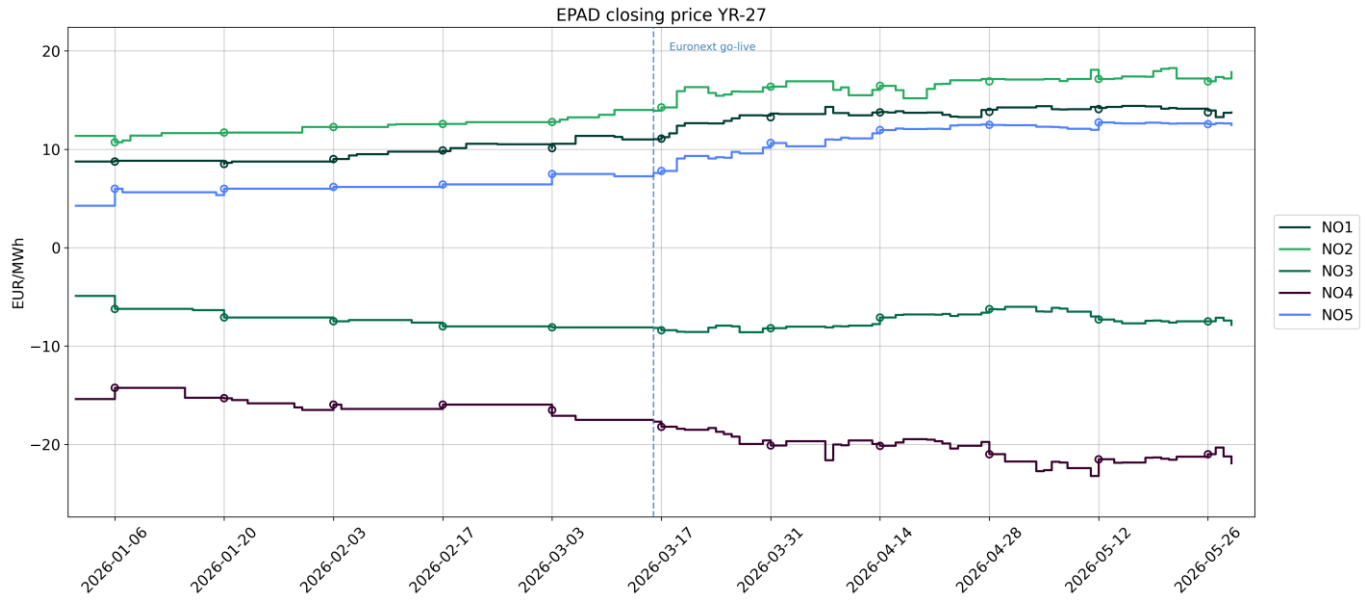

Figure 16: EPAD closing prices for the YR-27 contract in all Norwegian bidding zones. The dots represent the timing of the auctions. Data source: Nasdaq Commodities, Euronext and Montel.

In Figure 16, it can be observed that there are few trades for the YR-27 contract so far. Mentioned earlier, Euronext have introduced market makers in all Norwegian bidding zones. As a result of this, the market

always receives an updated closing price every trading day. This can be observed after the go-live for trading on Euronext in Figure 16.

Hedge effectiveness of congestion income

The EPAD auctions can be considered as a hedge of the congestion income for borders involved in the auctions. If the average price difference between two bidding zones in the day-ahead market exceeds the price of the EPAD contracts for these areas during the contract period, this will have a negative hedging effect on the congestion income. On the other hand, the EPAD contracts will contribute with a positive hedging effect if the price difference for EPAD contracts exceeds the price difference in the day-ahead marked between two areas.

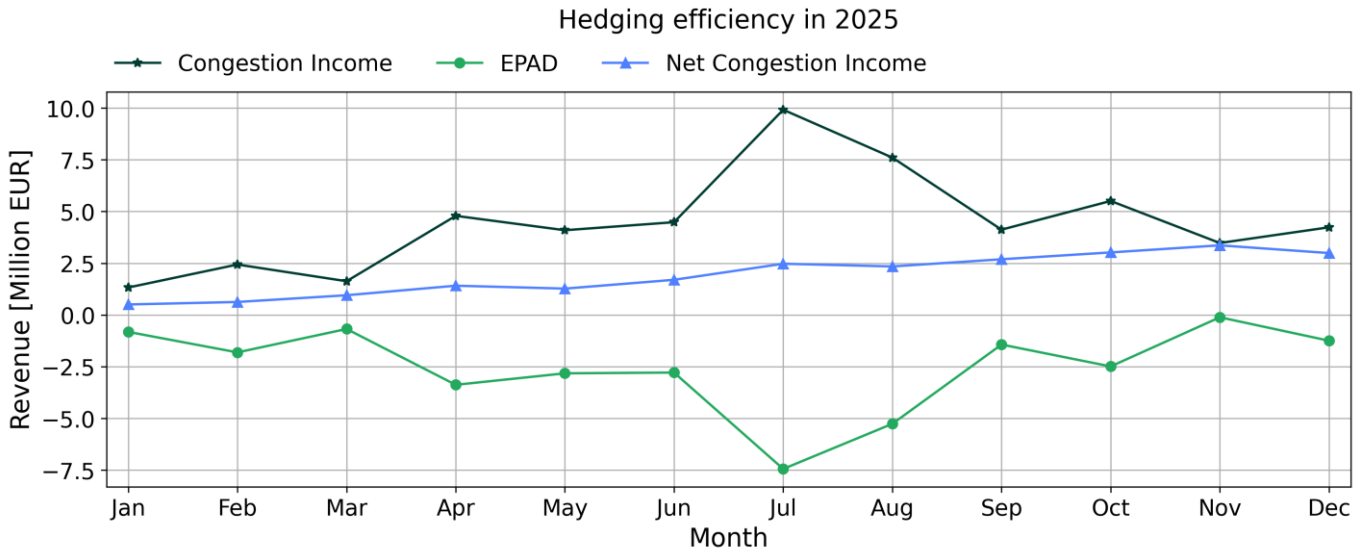

Figure 17: Hedging efficiency of EPAD auctions compared to congestion income of offered volume. Data source: Statnett.

As seen in Figure 17, the EPAD auctions had a negative hedging effect on the congestion income during 2025. This is particularly evident in July, where very high price differences occurred between NO5 and NO1 due to reduced transmission capacity because of high temperatures and maintenance on multiple transmission lines in NO5. Simultaneously, this is also the month with the highest congestion income because of these price differences.

Auction survey

Statnett conducted an auction survey during the first quarter of the year. The survey was shared with all participants in the latest EPAD-webinar hosted by Nord Pool 26.01.2026. Statnett received 14 replies from stakeholders. The single most striking feature in the responses was that all participants consistently pointed out that they considered the volume offered to be too low and not sufficient to fulfill their needs.

All respondents to the survey were participants in the EPAD auctions, and all had placed orders across all three different contract types (Month, Quarter, Year) during the auctions. Because the respondents constitute approximately 70 percent of the average number of participants in the EPAD-auctions, there is a well-founded reason to believe they constitute a fairly representative selection of the auction participants.

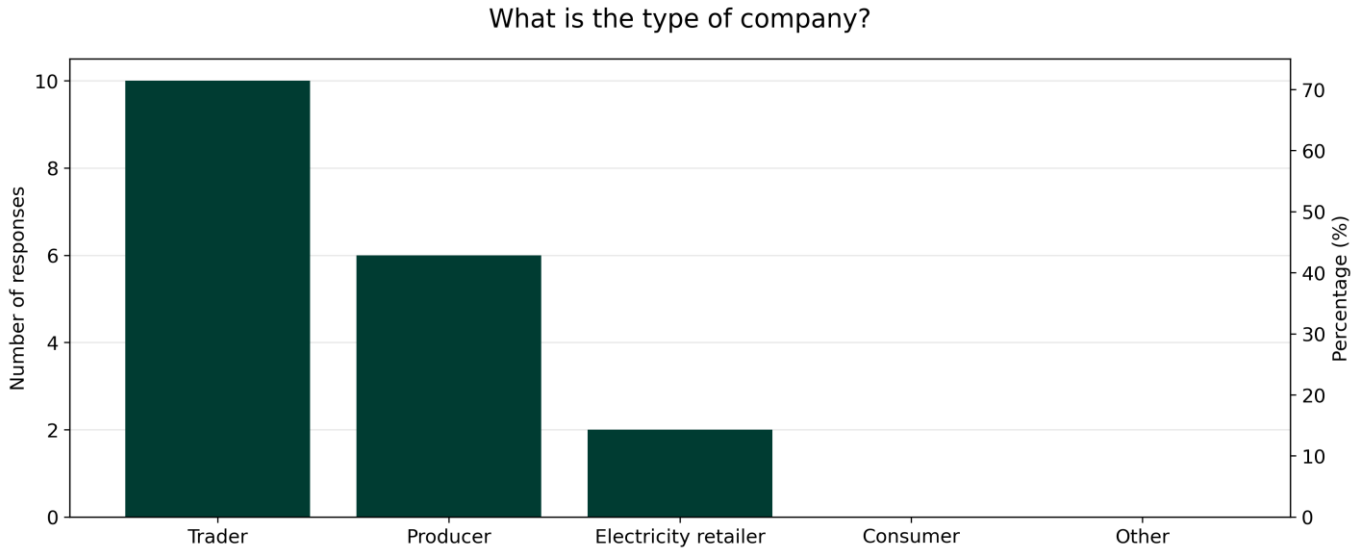

Figure 18: Type of company participating in the EPAD auctions.

Figure 18 shows the distribution of the participants in the survey. Because each respondent may report more than one status, the total number of respondents in the figure is above the actual number of respondents (14).

Also seen in Figure 18, the majority answered they were a trading company. Nevertheless, this often overlapped with status as producer and/or electricity retailer. Only two of the respondents replied they were electricity retailers, and none registered as consumers. However, there are more electricity retailer companies participating in the auctions, which did not respond to the survey. In Norway, the largest consumers are primarily using electricity retailers as BRPs, where their hedging needs are covered by the BRPs. This is the main reason why no participants consider themselves consumers.

Figure 19 sums up the answers to the question on frequency of participation in the EPAD auctions. As seen in the illustration below, 57 percent of the respondents participate and plan to participate in every auction,

while 43 percent plan to participate in most auctions. There were no participants planning to participate occasionally or less.

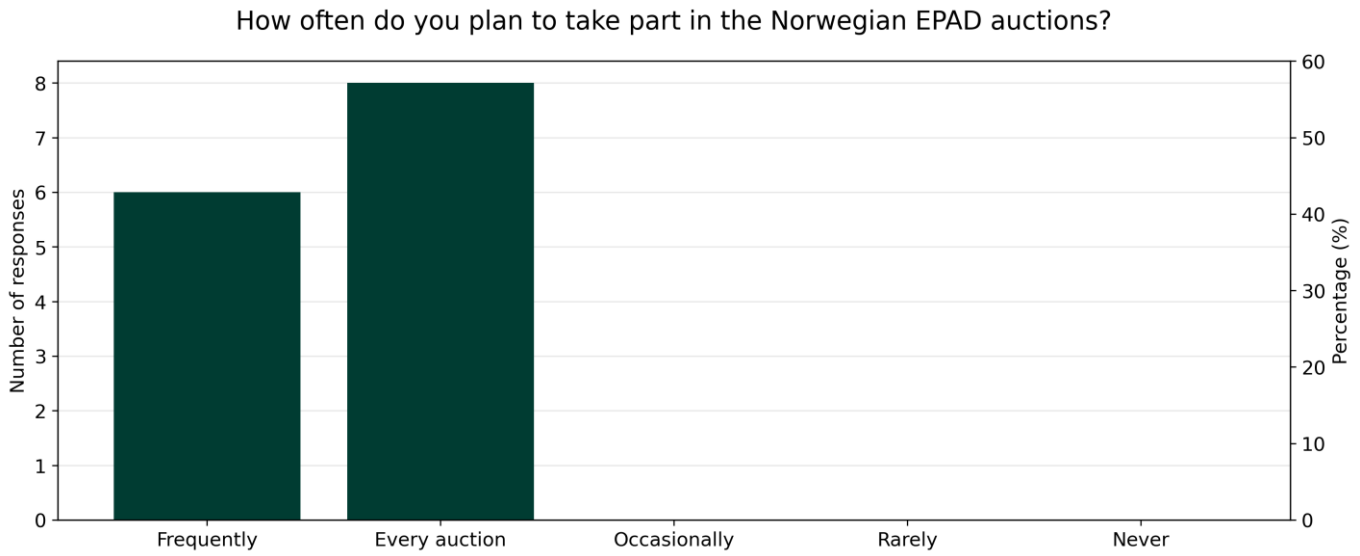

Figure 19: Frequency of participation in the auctions.

Mentioned previously, all five Norwegian bidding zones are included in the auctions, where NO1 is included in both the NO1-NO2 and NO1-NO5 borders. NO3-NO4 is a separate border, not connected to the other two. NO1 and NO2 are the areas with the highest participation of 93% percent as seen in Figure 20.

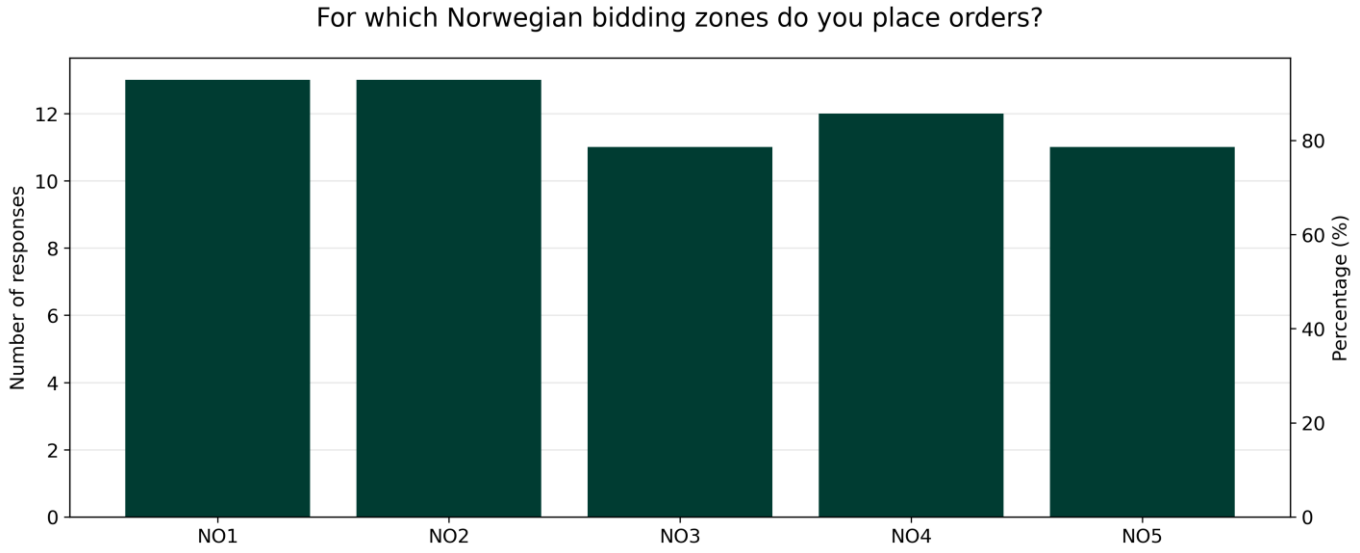

Figure 20: Distribution of bidding zones where the participants place orders.

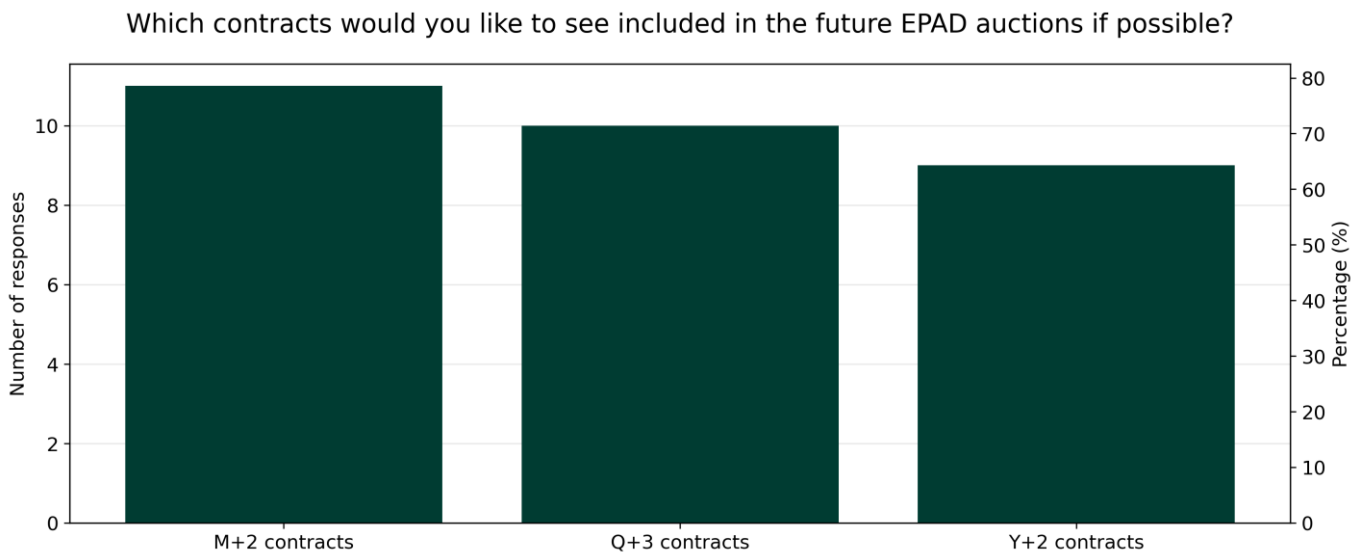

Figure 21: Distribution of contract type the participants want included in the auctions.

In the current auction design, the following contracts are offered: M+1, Q+1. Q+2 and Y+1. The participants were asked which contracts they preferred, where the M+2 contract had the highest response rate of 79 percent. The Y+2 contracts were the lowest, with 64 percent as observed in Figure 21.

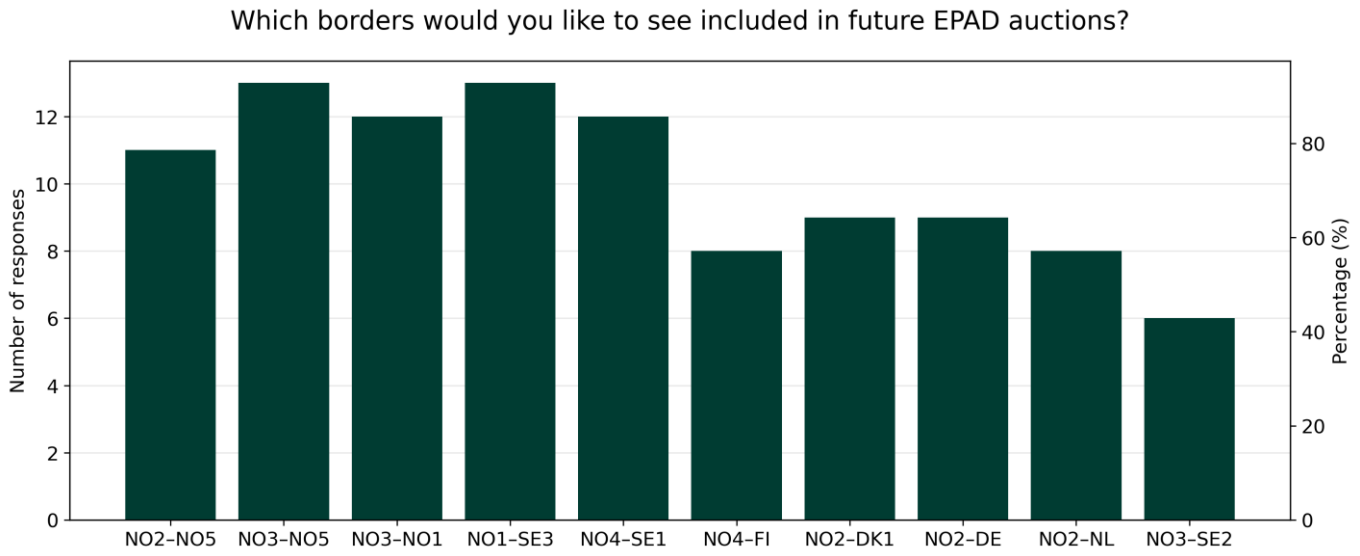

Figure 22: Borders the participants want included in the auctions.

The respondents were asked which borders they wanted to be included in the auctions, as observed in Figure 22.[8] The borders with highest interest were NO3-NO5 and NO1-SE3, where 93 percent wanted them included in the auctions. 86 percent wanted NO3-NO1 and NO4-SE1 included in the auctions, followed by 79% for NO2-NO5. This can be viewed to reflect that the market participants want more hedging volumes in general, but also in the southern part of Norway in particular and a link between the northern and southern part of Norway.

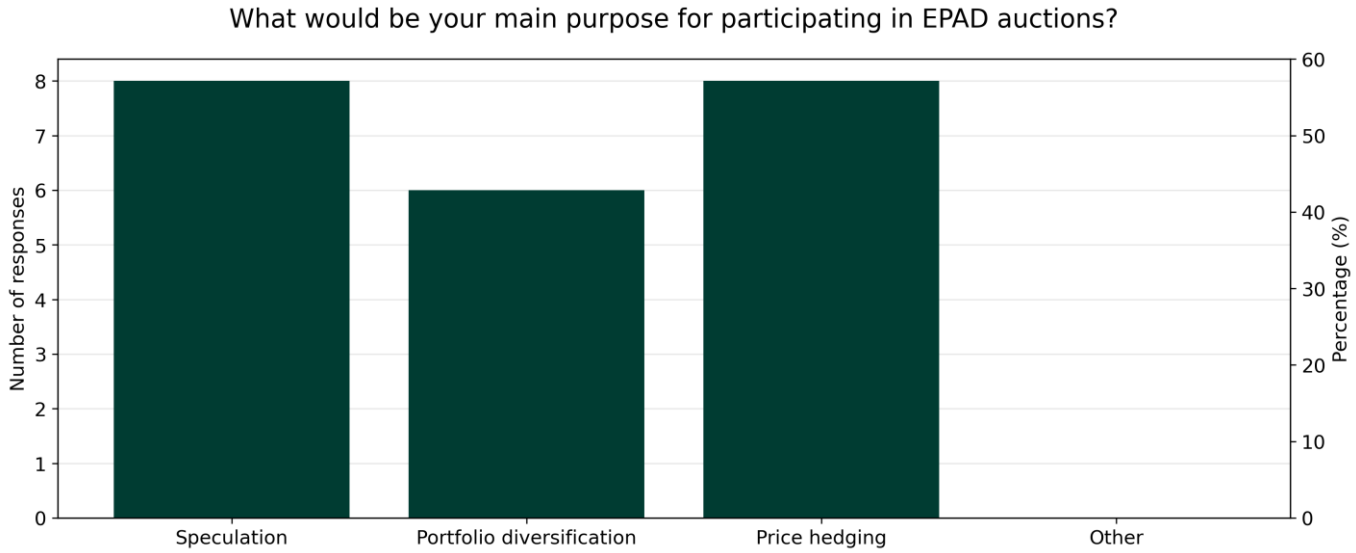

Figure 23: Purpose of participation in the auctions.

As seen in Figure 23, 57 percent of the participants had both price hedging and speculation as their main purpose for participating in the auctions. In some cases, all three alternatives were overlapping. The EPAD contracts can be used to hedge production but also work as a speculative product to gain profit, depending on the portfolio and company structure.

[8] NO2-UK and NO4-SE2 were excluded from the survey. UK is outside of the European market coupling and would require a completely different auction design. NO4-SE2 was excluded due to limited capacity on this border, which consists of a single 220 kV line. NO3-SE2 had originally a typo in the survey. Hence, it cannot be concluded that this is the least wanted border to be included in the auction.

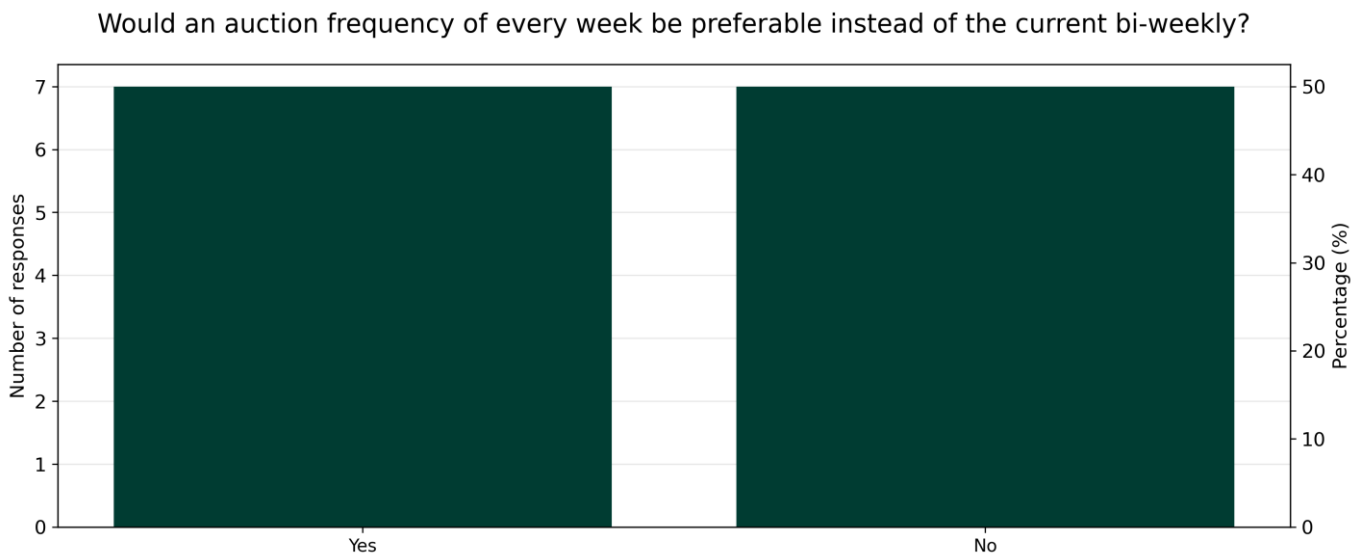

Figure 24: Perception of current auction frequency.

So far, EPAD-auctions have been conducted at a bi-weekly frequency with a break during the summer and Christmas. As seen in Figure 24, the market participants split 50/50 on whether there should be an auction every week or a continuation of the current practice. Most of the participants who answered no to weekly auctions pointed to volumes being split into smaller fractions with more frequent auctions as the reason. With the current position requirement from Statnett where 200-250 MW are offered on each border, a weekly auction would result in volumes of 5 MW for the monthly and quarterly contracts, and 2-3 MW for the annual contracts. All the respondents replied that the product mix of monthly, quarterly and annual contracts is appropriate in the questionnaire. However, 79 percent of the respondents do not find the distribution of the volume suitable, as seen in Figure 25. It was pointed out in the survey that the offered volumes would be 10 MW for the monthly and quarterly contracts, and 5 MW for the annual contracts.

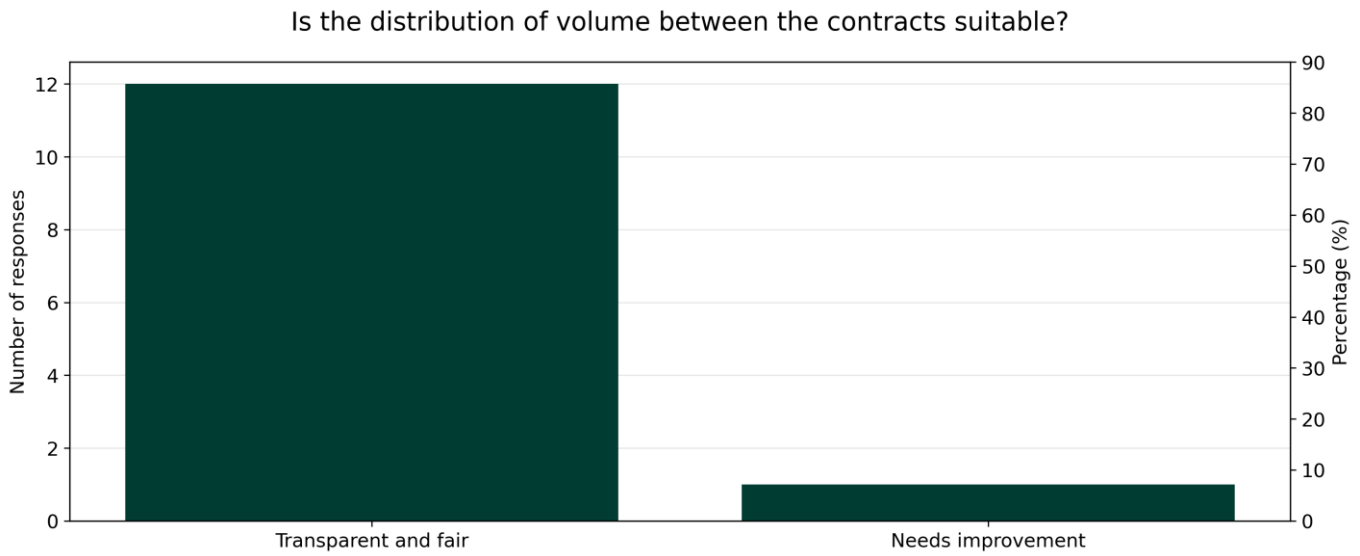

Figure 25: Perception of the distribution of volume.

Mentioned previously, the auctions are held on Tuesday every even week with gate closure 09 CET/CEST. The auctions take place 10.00 CET/CEST, and the results are usually published a few minutes later on the Nord Pool platform.[9]

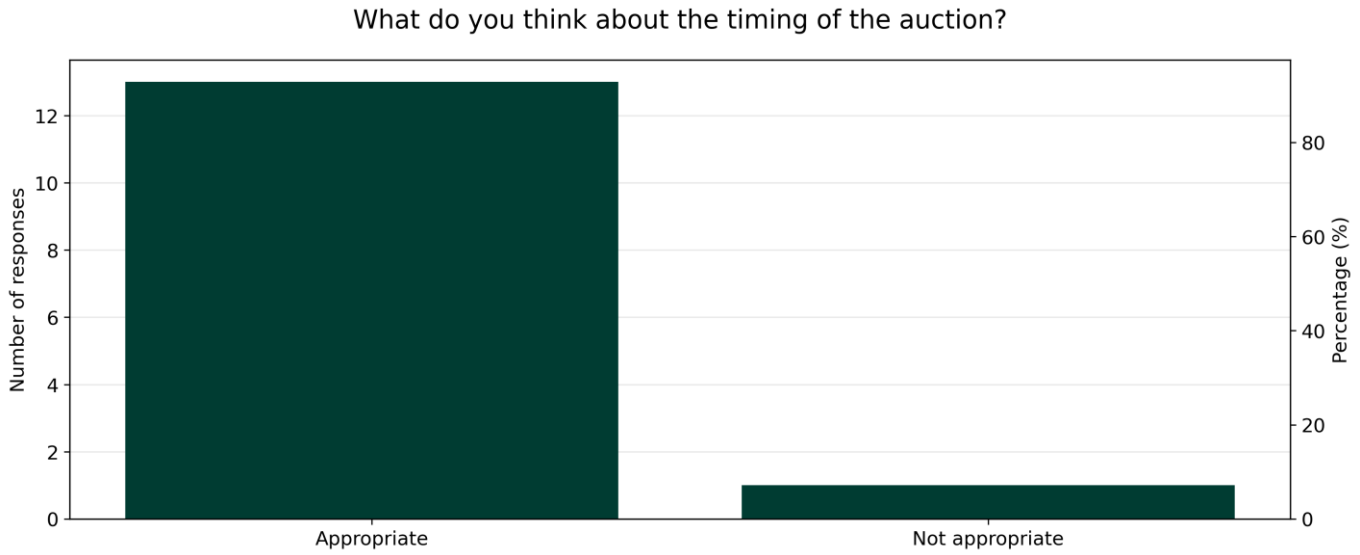

Figure 26: Perception of the timing of the auctions.

As seen in Figure 26, 93 percent of the respondents find the timing of the auctions appropriate. One respondent did not find the timing appropriate and suggested 12:00 as the gate closure.

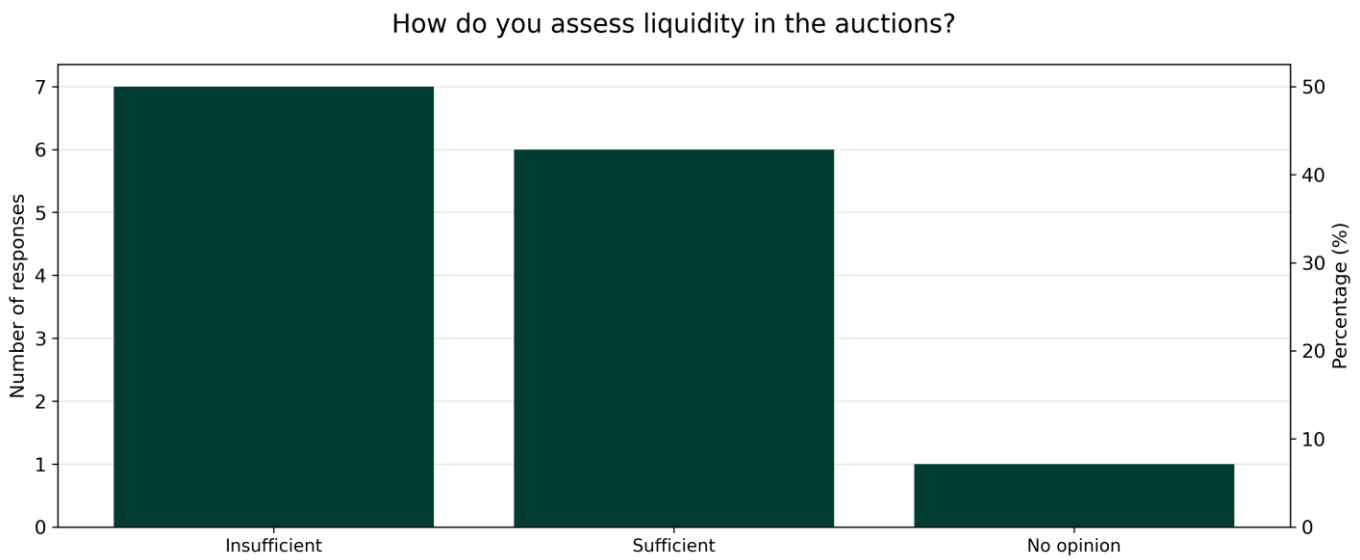

Figure 27: View on liquidity in the auctions.

The respondents are divided regarding their perception of the liquidity in the auctions, as seen in Figure 27. 50 percent find the liquidity insufficient, where 43 percent find the liquidity sufficient. As seen previously, the participants are not satisfied with the volume offered, which may be reflected in their view of the liquidity.

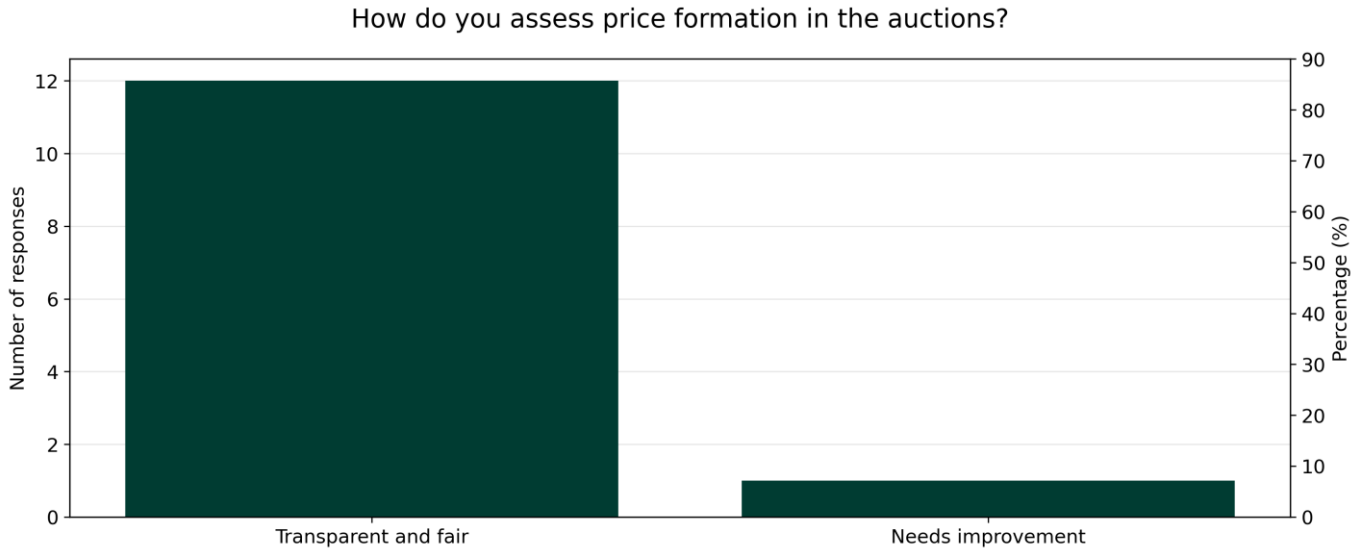

Figure 28: Perception of price formation in the auctions.

86 percent find the price formation transparent and fair, observed in Figure 28. One answered that it needs improvement, and one participant did not respond to this question.

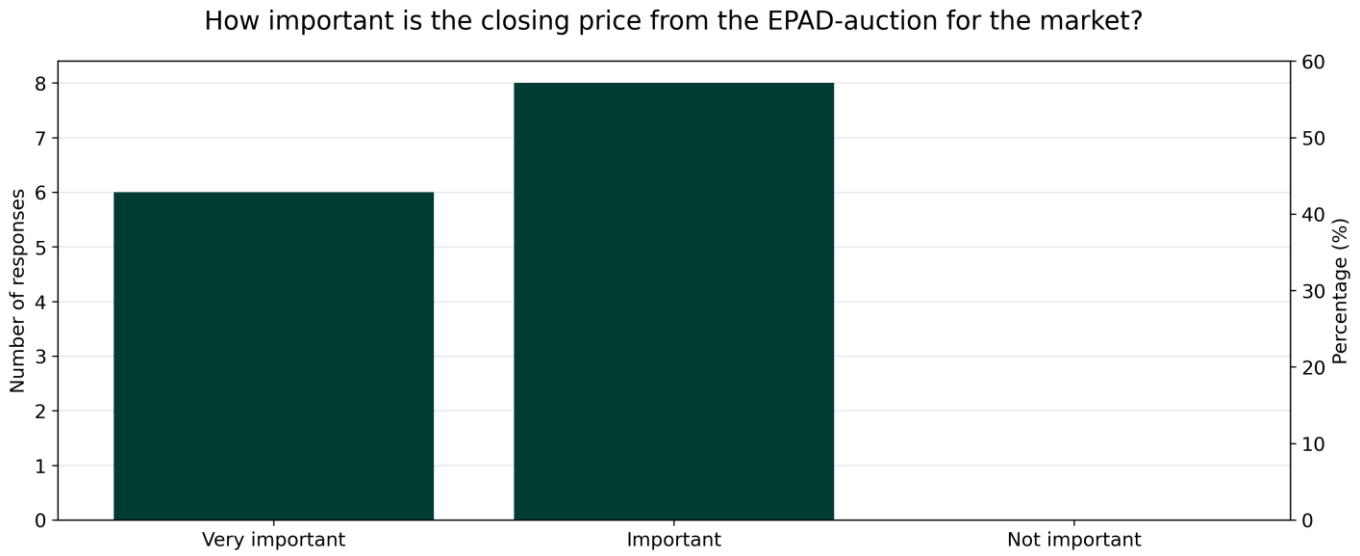

Figure 29: Perception of the importance that the auctions contribute with a closing price in the continuous market.

The respondents were asked about their view of the importance of the closing price in the auctions, as seen in Figure 29. All respondents replied that it is either important or very important. The participants have also previously mentioned that having a new closing price is one of the most important aspects of the auctions.

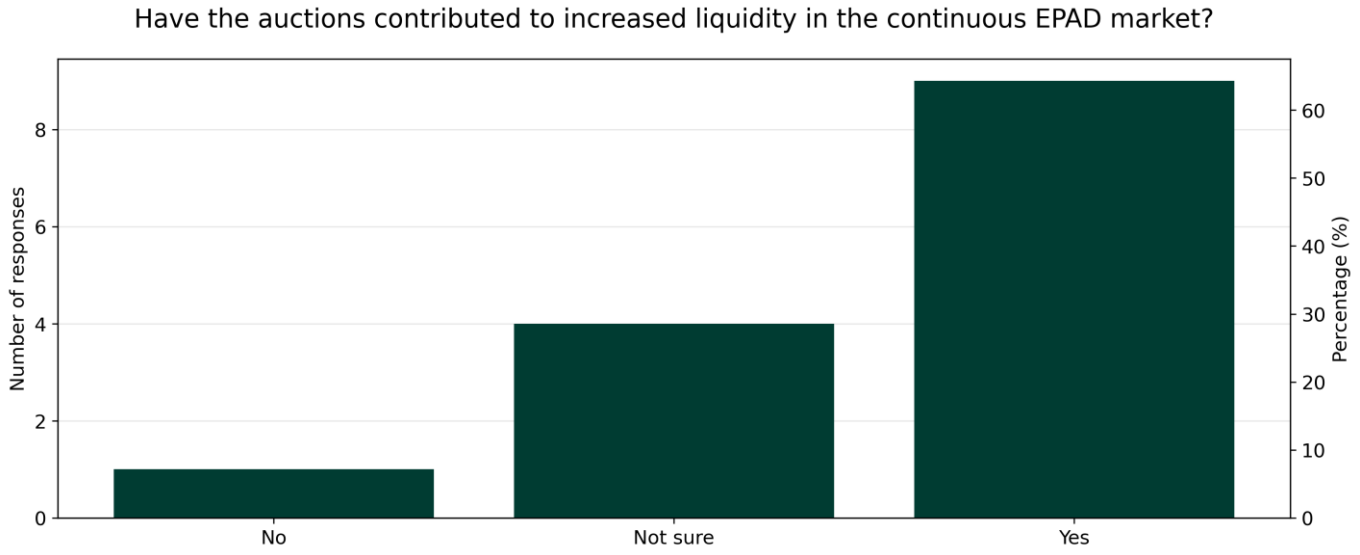

Figure 30: The impact the actions have on the continuous market.

A majority of the participants believe the auctions have contributed to increased liquidity on the continuous market, with a share of 64 percent. Only one respondent believed the auctions do not contribute to increased liquidity in the continuous market. Described previously, the volumes increased in the continuous

market from 12 TWh in 2024, to 16 TWh in 2025. Nevertheless, an increase was already observed in autumn 2024, a few months before auctions. One of the purposes of the auctions is that the participants can buy EPAD contracts in the auctions and sell these in the continuous market. Given the relatively high share of participants believe that the auctions contribute to increased liquidity in the continuous market, it is indicated that some trades occur between the auctions and the continuous market. This is also confirmed by Euronext.

Conclusion

The EPAD-auctions have now been running for 18 months, and the technical solution has worked smoothly without major issues. The outcome of the auctions has proceeded much as anticipated, and the auctions seem to operate within satisfactory pricing efficiency. There are some concerns amongst stakeholders towards the offered volumes being low and market coupling being limited between the northern and southern part of Norway. Nevertheless, the general feedback seems to be positive in that EPAD auctions provide benefits to the industry.

Looking at the metrics applied in this report, the auctions do indeed seem to fulfill much of the intended targets. Market interest and market depth seem to be within normal parameters, indicating good liquidity in the auctions. Pricing efficiency is picking up, at least according to the development of the friction costs in NO1, and as observed by auction prices serving as reference prices for continuous trade. We would however like to see more participation in the auctions, particularly with regard to retailers and end-consumers.

In the tables below we have summarized the outcomes of the metrics from both the auction results and from the stakeholder survey with scores rating from one to three pluses, and short comments on the scores

Metric	Score	Target	Comment
Bid to cover ratio	++	Market interest	Values above 2 are generally regarded as reflecting strong demand.
Short Implicit tails	++	Market depth	Values between 1-2 are considered to indicate normal to good market depth. Low values are better.
Friction Costs	+++	Pricing efficiency	It has been consistently improving. Sale and buy price should be equal in NO1 in an efficient market.
Participation	++	Market interest	Participation seems sufficient when observing the decreased friction cost in NO1
Reference price to continuous trade	++	Support to hedging	Auction prices indeed seem to provide good reference prices for the continuous market. However, little impact on traded volumes in the continuous market is observed. The auction volumes are adding to the total liquidity in the EPAD markets.
Hedging efficiency	+	Support to hedging	Pricing of EPADs in the auctions are consistently below the spot market prices
Stakeholder feedback	++	Support to hedging	Stakeholders are mostly pleased with the auctions. But consistent request for more volumes, market coupling between north and south and towards Sweden by most stakeholders

Appendix

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 max 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 max matchable volume

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