

ESMA Market Report

EU carbon markets 2024



ESMA Market Report on EU carbon markets 2024

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Executive Summary

The revision of the EU Directive establishing a system for greenhouse gas (GHG) emission allowance trading within the Union (EU ETS Directive) requires ESMA to “*monitor the integrity and transparency of the European carbon market, in particular with regard to market volatility and price evolution, the operation of the auctions, trading operations on the market for emission allowances and derivatives thereof, including over-the-counter trading, liquidity and the volumes traded, and the categories and trading behaviour of market participants, including positions of financial intermediaries.*”

In response to this mandate, ESMA publishes an annual report on EU carbon markets, organised as follows: Section 1 on prices and volatility, Section 2 on auctions, Section 3 on secondary markets trading and Section 4 on derivatives market positions. For this, the report is exploiting a combination of commercial and regulatory data sources, providing a unique level of detail and insights into the functioning of the EU ETS market.

This first edition builds on the 2022 report ESMA published on the trading of EU emission allowances (EUAs), mandated in the context of rising energy prices and a three-fold increase in EUA prices in 2021¹. Since the 2022 ESMA report, prices have significantly come down against a different economic, geopolitical, and political backdrop. Prices in the EU ETS have declined since the beginning of 2023, averaging EUR 83 per tonne of CO₂-equivalent emissions during the year. This reflected a combination of lower demand for EUAs from weak industrial activity, falling natural gas prices and decarbonisation of the European energy sector, along with increased supply following the decision to auction additional allowances to finance the REPowerEU plan. Intraday and historical volatility measures remained low throughout the observation period (2023²).

Nevertheless, as this report makes clear, some of the structural features of EU carbon markets remain unchanged since the 2022 ESMA report. EUA primary markets remain significantly concentrated, with around 10 participants buying 90% of auctioned volumes, reflecting a preference by most EU ETS operators to source allowances from financial intermediaries. The vast majority of trading in secondary markets is done through derivatives, reflecting the annual EU ETS compliance cycle where non-financial sector firms hold long positions (for compliance purposes) while banks and investment firms hold short positions.

The EU ETS Directive also mandates ESMA to make recommendations in its assessments, where necessary. The analysis has not unveiled any significant issue in the functioning of EU carbon markets. However, the reporting of prices for transactions combining the simultaneous purchase and sale of financial instruments under MiFIR transaction reporting (RTS 22) could be improved, which would help with the identification of trading strategies.

¹ See ESMA (2022), [Final Report: Emission allowances and associated derivatives](#).

² In the section on prices and volatility the report covers developments through mid-2024. The other sections rely on 2023 regulatory data.

Essential statistics

Prices and volatility

	2023	2022
Spot price (EUR/tCO ₂)	83	81
5Y forward price (EUR/tCO ₂)	105	103
Volatility (%)		
Historical	1.9	3.3
Intraday	1.0	1.5
Total Number of Allowances in Circulation (MtCO ₂ e)	1,112	1,135
Verified GHG emissions (MtCO ₂ e)	1,127	1,313

Primary markets – Auctions

	2023	2022
Number of auctions held	223	222
Number of allowances auctioned (MtCO ₂ e)	523	491
Volumes of allowances auctioned (EUR bn)	43.6	38.8
Number of participants	44	N/A
Non-financials	30	N/A
Financials	14	N/A
Coverage ratio (%)	202	215

Secondary markets – Trading

	tCO ₂ ¹ billion (2023)	EUR billion (2023)
Trading volumes		
On exchange	9.3	648
Futures	7.6	643
Options	1.7	0.9
Other contracts (including spot)	0.03	4.1
Off exchange	0.9	72.5
Share of volumes traded (%)		
Compliance entities and other non-financials	31	26
Investment firms and credit institutions	56	63
Investment funds	12	10
Rest ²	1	1

Positions in EUA derivatives

	2023
Average daily number of position holders	783
Compliance entities and other non-financials	205
Credit institutions and investment firms	118
Investment funds	406
Rest*	55
Average daily net long positions (thousands)	
Compliance entities and other non-financials	+359
Credit institutions and investment firms	-362
Investment funds	-2
Rest ²	+3

Note: ¹tCO₂= Tonnes of CO₂-equivalent emissions. ²Rest= Other financials and unclassified entities (e.g. due to the absence of identifiers).
Sources: ICE Endex, European Energy Exchange, Nasdaq Oslo, Refinitiv Eikon, Union Registry, ESMA

Prices and volatility

Summary

EUA prices declined in 2023 after reaching 100 EUR/tCO₂ for the first time in February. Price developments were mainly driven by a weak economic activity weighing on demand, increased coal-to-gas fuel switching and higher renewable energy production along with EU climate policies. The EUA forward curve flattened amid a falling yield environment and volatility stayed below 2022 levels. Verified GHG emissions of firms in EU ETS scope fell sharply while overall EUA supply temporarily increased due to the front-loading of auctioned volumes. However, combined with the absorption of allowances by the Market Stability Reserve, this resulted in a broadly stable number of allowances in circulation.

Prices declined, volatility contained

The **price of EUAs** overall declined in 2023 after breaching the EUR 100 per tonne of CO₂-equivalent emissions (tCO₂) mark for the first time in February 2023. Prices ended the year below EUR 70/tCO₂ before recovering partially in 1H24 (CMR.2).

The decline was driven by three main factors. First, a wider economic slowdown across the EU compared to 2022 and lower energy consumption weighed on the demand for EUAs.

Second, amid falling natural gas prices, fuel switching started to play a role in the power generation sector again, leading to a reduction in coal-based power generation. Together with a significant increase in renewable energy production, this resulted in lower GHG emissions.

Third, the EU's climate policy agenda affected EUA prices in two ways. The EU ETS reform – including a faster reduction of the ETS cap³ – helped lift EUA prices to their record high in February. On the other hand, the EU's renewable energy acceleration program (REPowerEU), which led to front-loading auctioned volumes to finance the energy transition⁴, had a negative impact on prices.

The most liquid front-year December future contract traded close to the EUA spot price throughout 2023. Longer dated futures traded above the spot price, as reflected in the upward-sloping forward curve (CMR.3). However, due to falling yields in 2023 (as main component of EUA futures' cost of carry⁵) the **forward curve** also flattened.

Historical **volatility**⁶ remained contained in 2023 (1.9%) and 1H24, markedly below its 2022 level (3.3%). Both, historical and intraday volatility measures fell in 2023 (CMR.5 and CMR.6).

Higher supply coincided with lower demand

In 2023, 1,127mn tonnes of CO₂ were offset under the EU ETS⁷. This was a decrease of 16% year-on-year primarily driven by a 24% reduction in verified GHG emissions from power generation⁸. There were 560mn EUAs allocated for free (-1%) and 523mn auctioned (+7%)⁹, an overall increase of annual supply by 3%. Demand thus exceeded supply by 43mn EUAs and the **total number of allowances in circulation** (TNAC) decreased by 2% to 1.1bn. This compares to a 22% decrease of the TNAC in 2022 (CMR.1).

³ Other elements of the reform included expansion of the ETS to further sectors, creation of a second ETS, the new EU Carbon Border Adjustment Mechanism, and a strengthening of the Market Stability Reserve.

⁴ See [Revised 2023 auction calendar published](#).

⁵ Futures' costs of carry generally comprise the risk-free interest rate and storage costs less a potential convenience yield. However, storage costs and convenience yield for EUAs are negligible.

⁶ Measured as annual standard deviation of daily returns.

⁷ Preliminary numbers as of April 2024.

⁸ Total power generation fell by only 2.3% highlighting that emission reductions mainly resulted from the switch to less polluting energy sources, including renewables.

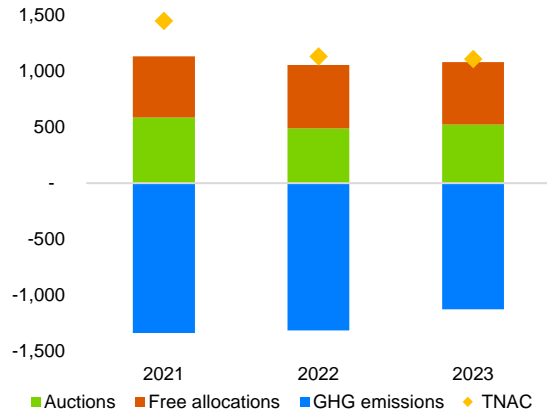
⁹ The number of auctioned allowances is net of 323mn EUAs that were absorbed by the [Market Stability Reserve](#) (369mn EUAs were absorbed in 2022) and contains 35mn EUAs to finance the [REPowerEU](#) program.

Key indicators

CMR.1

Supply and demand

GHG emissions declined 16% in 2023

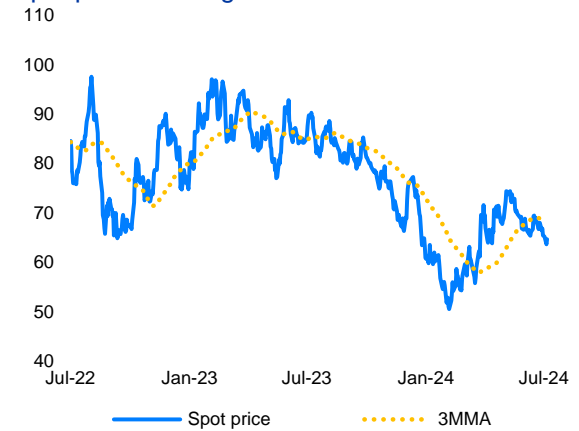


Note: Annual supply (free allocations and auctions) and demand (GHG emissions) of EUAs, in metric tonnes of CO₂. TNAC=Total Number of Allowances in Circulation.
Sources: European Commission, ESMA.

CMR.2

Spot price

Spot prices averaged EUR 83/tCO₂ in 2023

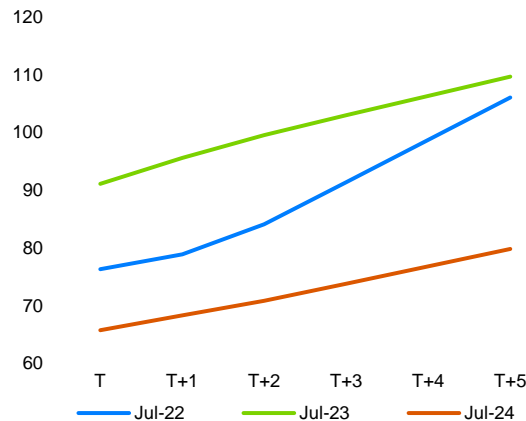


Note: Daily spot price of EU emission allowances. 3MMA= three-month moving average.
Sources: Refinitiv EIKON, ESMA.

CMR.3

Forward curve

Forward curve flattened and shifted lower in 2023



Note: Forward curve of December futures contracts on EU emission allowances traded on ICE Endex.
Sources: Refinitiv EIKON, ESMA.

CMR.4

Cost of carry

Cost of carry declined

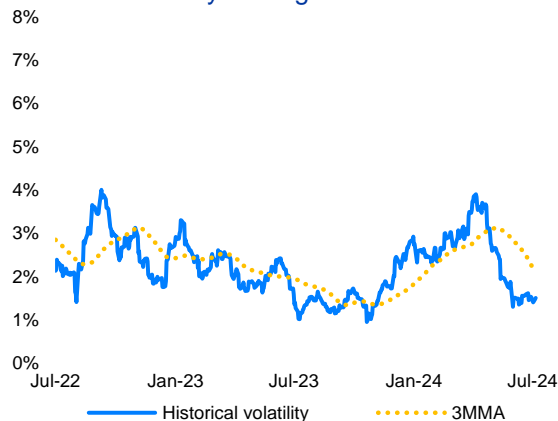


Note: Absolute and relative 5-year forward spread of EU emission allowances, calculated as difference between front year and 5-year futures.
Sources: Refinitiv EIKON, ESMA.

CMR.5

Historical volatility

Historical volatility averaged 2% in 2023

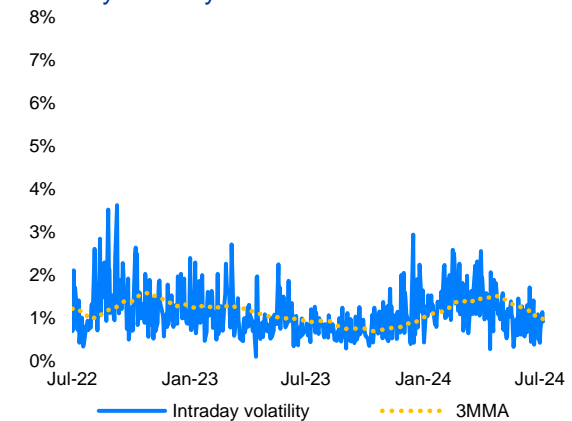


Note: Historical volatility of EU emission allowance prices calculated as 20-day standard deviation of daily returns. 3MMA= three-month moving average.
Sources: Refinitiv EIKON, ESMA.

CMR.6

Intraday volatility

Intraday volatility remained low



Note: Intraday volatility of EU emission allowance prices calculated following the Parkinson method. 3MMA= three-month moving average.
Sources: Refinitiv EIKON, ESMA.

Auctions

Summary

In 2023, 523mn emission allowances (EUR 44bn) were auctioned, a 7% increase from 2022. All auctions were oversubscribed and the number of auction participants was around 20 per auction. Investment firms and credit institutions along with non-financial sector firms without compliance obligations represented the main actors in the primary market. The majority of EUAs were bought by entities domiciled in Germany (57%). Auctioned volumes remained significantly concentrated across only a few market participants, with 90% of EUAs acquired by the top 10 participants.

Volumes increased

In 2023, a total of 523mn¹⁰ emission allowances were auctioned on the European Energy Exchange (EEX), equivalent to an **annual volume** of EUR 44bn¹¹. This represents a year-on-year increase of 7% in the number of auctioned EUAs. The increase was anticipated under the EU's response to the energy market shortages caused by the Russian invasion of Ukraine (REPowerEU) which is partially financed by the EU ETS. An additional EUR 20bn of auctioned EUAs are envisaged from 2023 to 2026, followed by a faster tightening of supply from 2026 onwards.

A total of 223 auctions took place throughout 2023 with an average monthly turnover of 43mn EUAs (EUR 3.6bn). Reduced volumes were auctioned in August and December, reflecting the usually less active summer and holiday periods (CMR.7).

Oversubscribed auctions despite limited participation

Auctions attracted 20 **participants** on average out of which 15 bidders were successful (CMR.8). Around 40% of the bids were successful, 4pp below the previous year. All auctions were oversubscribed with an average cover ratio¹² of 202%, 13pp less than in 2022 (CMR.12).

About 80% of EUAs were purchased by entities not under direct compliance obligation in the EU ETS (investment firms and credit institutions,

along with other non-financial entities, CMR.9). However, this includes entities belonging to groups with other subsidiaries under compliance obligation. According to a survey, the low participation by compliance entities in auctions was mainly driven by the convenience and cost-effectiveness offered by financial intermediaries (acquiring allowances on their behalf), low volumes or frequency of EUA purchases, and limited expertise in financial markets¹³.

More than half of auctioned allowances were acquired by entities domiciled in Germany (57%), followed by entities domiciled in the UK (17%) part of large cross-border groups with installations within the EU ETS scope (CMR.10).

High concentration

The primary market remains **considerably concentrated** with only 44 active participants – compared with approximately 10,000 installations with compliance obligations.

In 2023, ten participants alone purchased 90% of auctioned EUAs (CMR.11). In each auction, the top three buyers usually got allocated between 50% and 80% of the total volume.

The ESMA 2022 report highlighted that most auction participants acted as net sellers of emission allowances in the secondary market, and some may purchase EUAs from auctions as brokers on behalf of their clients.

¹⁰ The number of auctioned allowances is net of 323mn EUAs absorbed by the [Market Stability Reserve](#) (vs. 369mn EUAs absorbed in 2022) and includes 35mn EUAs to finance the [REPowerEU](#) program.

¹¹ Thereof 6mn EUAs, equivalent to EUR 470mn.

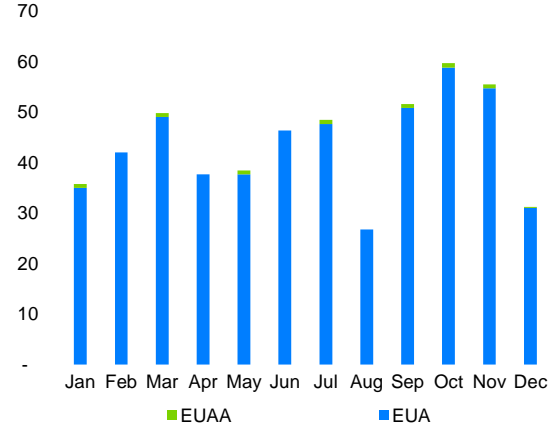
¹² The cover ratio is defined as aggregate volume of bids divided by the auction volume, in tCO₂.

¹³ See [Europe Economics, Participation in the EU ETS markets – A report for DG CLIMA](#).

Key indicators

CMR.7

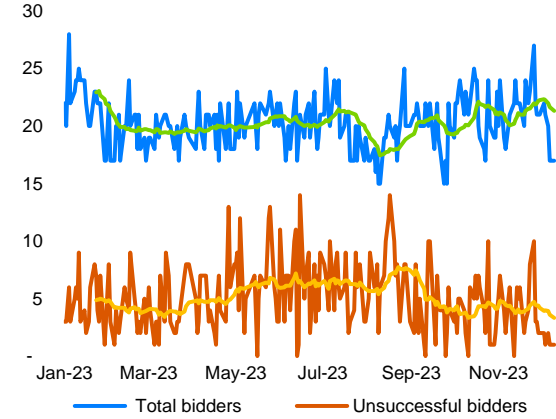
Monthly auctioned volumes
44mn EUAs auctioned per month



Note: Number of auctioned European emission allowances (EUA) and European aviation allowances (EUAA), in million.
Sources: Bafin, ESMA.

CMR.8

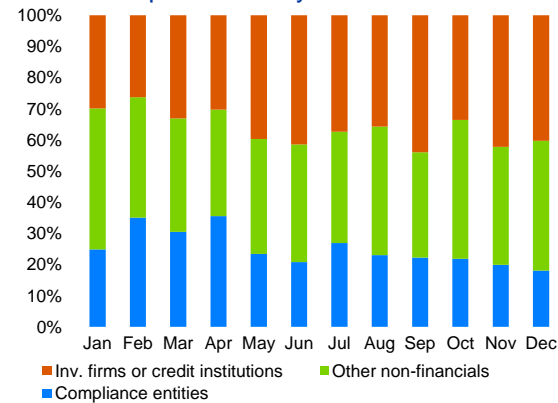
Number of auction participants
Around 20 participants per auction



Note: Total number of bidders and number of unsuccessful bidders in auctions of European emission allowances (EUA) and 1-month moving averages.
Sources: EEX, ESMA.

CMR.9

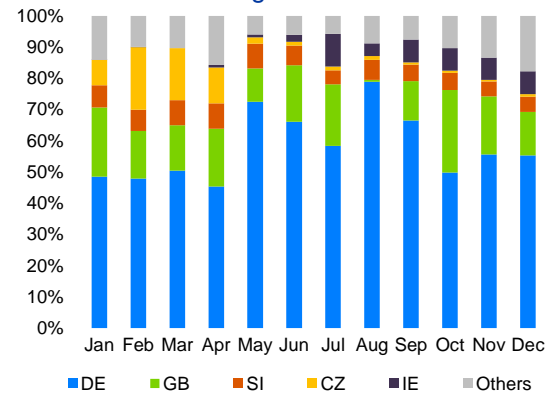
Auction participants by sector
Most EUAs purchased by banks and inv. firms



Note: Distribution of auctioned European emission allowances (EUA) by classification of auction participants.
Sources: Bafin, ESMA.

CMR.10

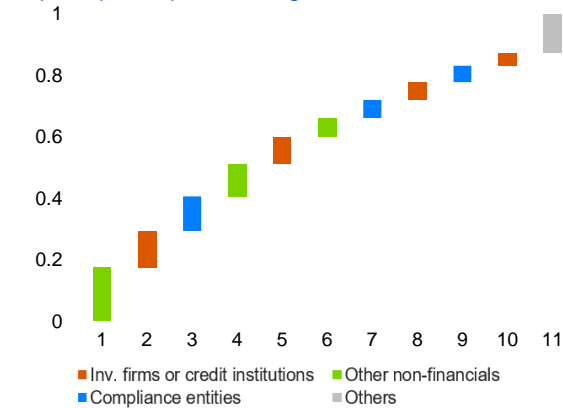
Auction participants by domicile
German entities bought 57% of auctioned EUAs



Note: Distribution of auctioned European emission allowances (EUA) by domicile of auction participants.
Sources: Bafin, ESMA.

CMR.11

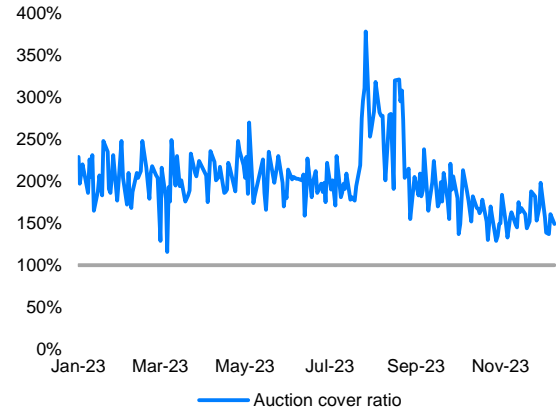
Share of top 10 auction participants
Top 10 participants bought 87% of EUAs



Note: Top-10 auction participants by share of annual auction volume of European emission allowances (EUA).
Sources: Bafin, ESMA.

CMR.12

Auction cover ratio
All EUA auctions were oversubscribed



Note: Auction cover ratio for European emission allowances (EUA).
Sources: EEX, ESMA.

Secondary markets – Trading

Summary

Trading activity in EUAs was broadly stable in 2023, with cyclical peaks in March and December linked to the rollover of future contracts on expiry. Overall, 9.3 bn tonnes of CO₂-equivalent emissions (tCO₂, equivalent to EUR 648 bn) were exchanged on EU trading venues in 2023, through 3.2mn transactions. Over-the-counter trading activity was much smaller in comparison, with 864mn tCO₂ (EUR 72.5bn) exchanged in total. Investment firms and credit institutions dominated both the on- and off-exchange markets, accounting for 56% of total trading volumes, followed by other non-financials (25%) and investment funds (12%). 68% of the volumes were traded by non-EEA entities (34% US and 24% UK), while the most active EEA entities were domiciled in DE (14%) and NL (8%). The vast majority of transactions involved futures contracts (99%), though options trade size (in terms of tCO₂) tend to be larger than other derivative types. Spot contracts saw a large increase in OTC trading volumes in December.

Stable on-exchange trading

In 2023, a total of 9.3bn **tonnes of CO₂-equivalent emissions** (tCO₂) in EUA contracts were bought on EU trading venues, worth EUR 648bn. These originated from 3.2mn transactions.¹⁴ Most of the on-venue trading occurred through futures (or mini-futures¹⁵) derivatives contracts, which represented 99% of the transactions and 81% of total trading volumes (CMR.17). There were only few transactions in option contracts (8,707), which accounted for almost 18% of total trading volumes in 2023 (1.7bn tCO₂ or EUR 0.9bn).¹⁶

The main actors in EUA secondary markets were investment firms and credit institutions, involved in 56% (5.2bn tCO₂ or EUR 408bn) of the total volumes exchanged. In line with the ESMA 2022 report, EUA trading was mainly concentrated within entities domiciled in the US (34% of the volumes), followed by the UK (24%), DE (14%) and NL (8%).

On aggregate, trading in EUA derivatives was stable in 2023, without any major movement.

Nonetheless, the daily **number of transactions** (CMR.13) shows three main periods of increased activity. One, in June, possibly relates to the publication of the Green Finance Package by the European Commission. The others were in March and December, when the most liquid futures contracts expire. The increased trading activity was also reflected in the larger volumes of tCO₂ and monetary value exchanged.

Entities with large compliance obligations often buy derivatives to lock in EUA prices and limit balance sheet exposure. This strategy helps them control cash flow throughout the year. Compliance entities typically purchase December futures. After buying, they have two main options. They can hold them until expiry and take delivery of the physical underlying. Alternatively, they can roll over their position to March (which coincides with the annual publication of verified GHG emissions by compliance entities), or to the following December contract.¹⁷

Within the on-exchange trading segment of the market, a few particular trading strategies have been identified. First, there is evidence of trading activity from **high-frequency trading** (HFT) firms and some financial intermediaries engaging in

¹⁴ On-exchange transactions and trading volumes refer, in this section, to the buy-side leg (since sell-side on exchange transactions mirror buy transactions and are reported separately). Hence, figures should be read as buy transactions and volumes bought. See Annex for the methodology.

¹⁵ For more information, see [EUA Mini Futures](#) (ICE ENDEX).

¹⁶ Monetary volumes (in EUR) are calculated by the multiplication of price, quantity and multiplier. The multiplier is expressed in number of lots included in a transaction (1,000 for future and option contracts and 1 for spot derivatives). In case of options, this approach might underestimate the total monetary value. The impact on the overall volumes remains yet limited.

¹⁷ See [Europe Economics, Participation in the EU ETS markets – A report for DG CLIMA](#).

algorithmic trading. Based on number of transactions, two of the three most active buyers in the market were HFT firms, including one domiciled outside the EU. Second, 39% of the total volumes traded on-exchange (3.6bn tCO₂, or EUR 198bn from 498,000 transactions) originated from **trades on spreads** – which may also involve strategies based on algorithmic trading. These are transactions that combine the simultaneous purchase and sale of more than one financial instrument. The trades executed are contingent on each other as a ‘package’ with the objective to create a non-directional exposure to EUA maturity spreads.

These strategies can be undertaken by investors with a low risk profile that seek exposures to the spread between two contracts rather than to the underlying instrument of the derivative; or when counterparties roll over their positions from one year to the next. These spreads are concentrated on the most liquid end-of-year contracts. December-to-December spreads make up over 80% of all traded strategies, with the 2023-to-2024 spread accounting for around 60% of the total. The rest of the spread strategies are a mix of month-ends to year-ends (e.g. Mar-2023 to Dec-2023), and spreads between the daily future and the end of month future (mainly in December).

Another type of strategy already identified in the ESMA 2022 report relates to **‘buy-and-hold’** investors that are seeking long-term, directional exposure. However, the assets under management of the funds tracking EUAs have fallen significantly since 2022, in line with prices. Finally, entities with larger compliance obligations

that receive few or no freely allocated allowances tend to buy derivatives to **hedge their future exposure** to carbon prices.

Off-exchange: Activity increased toward year-end

Over-the-counter (OTC) trading only accounted for a small share of total trading volumes in EUAs. There were 524,000 OTC transactions in 2023 through which 864mn tCO₂ (or EUR 72.5bn) were exchanged, i.e. less than one-tenth of the volume transacted on-exchange. A positive correlation (0.51) between the number of on-exchange and off-exchange transactions per day points to moderate co-movement of market activity in the two market segments.

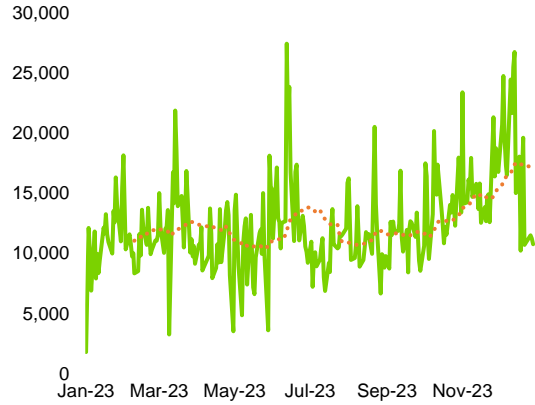
Trading in **spot contracts** drove an increase in OTC trading activity in December (CMR.20), with 44mn tCO₂ exchanged compared to a monthly average of 9.5mn tCO₂ for the rest of the year. One possible explanation is that compliance entities with low GHG emissions and/or obtaining the majority of their allowances through free allocation tend to buy spot allowances to make up the shortfall in emissions, usually close to the expiry date of EUA derivatives contract.¹⁸

The majority of total trading (48%) occurred within investment firms or credit institutions or between the latter and other non-financial sector entities (19%) (CMR.21). Concerning options, there is evidence in the data that major credit institutions purchase instruments from clearing members to sell to non-financial counterparties.

¹⁸ Extract also taken from [Europe Economics, Participation in the EU ETS markets – A report for DG CLIMA](#).

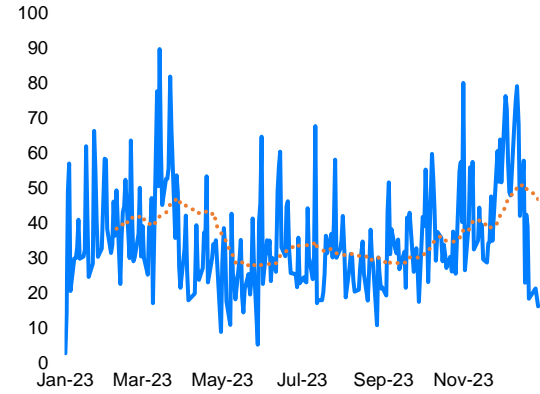
Key indicators

CMR.13
Daily number of transactions on-exchange
Increase in December



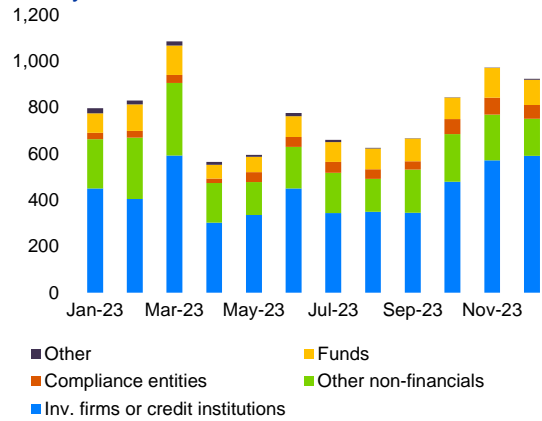
Note: Daily number of on-exchange buy transactions. 30/days moving average in orange.
Sources: MiFIR, ESMA.

CMR.14
Daily trading volumes on-exchange
Peaks in March and December



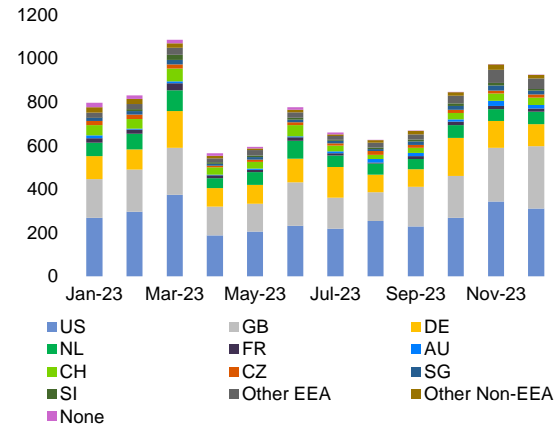
Note: On-exchange daily trading volumes in EUA derivatives, in millions of tonnes of CO2-equivalent emissions.
Sources: MiFIR, ESMA.

CMR.15
On-exchange volumes by counterparty sector
Mainly investment firms and credit institutions



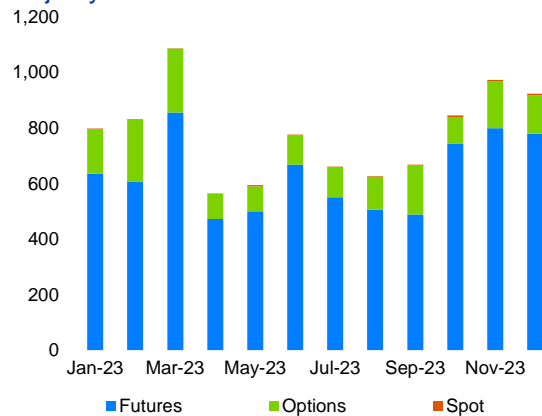
Note: Monthly trading volumes by counterparty country, in million of tonnes of CO2-equivalent emissions
Sources: MiFIR, ESMA.

CMR.16
On-exchange volumes by counterparty country
US and UK entities dominate the market



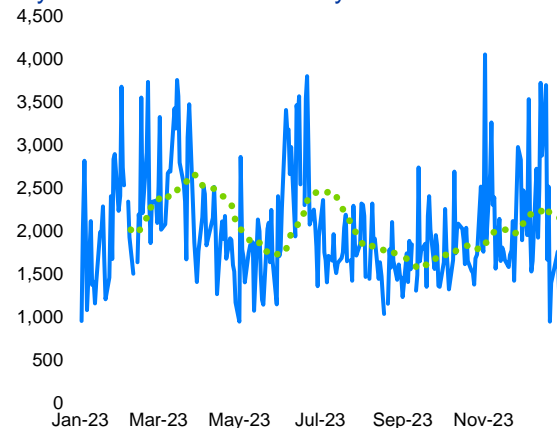
Note: Monthly trading volumes by counterparty country, in million of tonnes of CO2-equivalent emissions
Sources: MiFIR, ESMA.

CMR.17
On-exchange volumes by instrument type
Majority of futures contracts



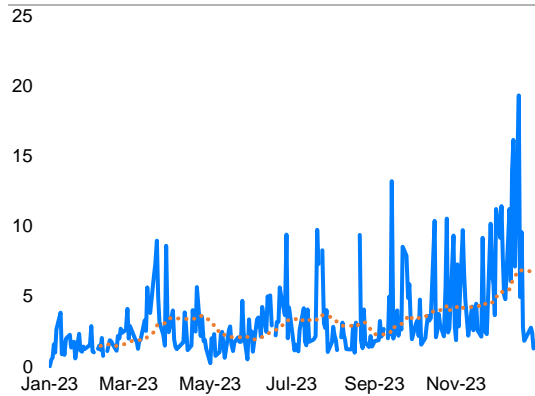
Note: Monthly trading volumes by instrument type, in million of tonnes of CO2-equivalent emissions
Sources: MiFIR, ESMA.

CMR.18
Daily number of transactions off-exchange
Cyclical increases in activity



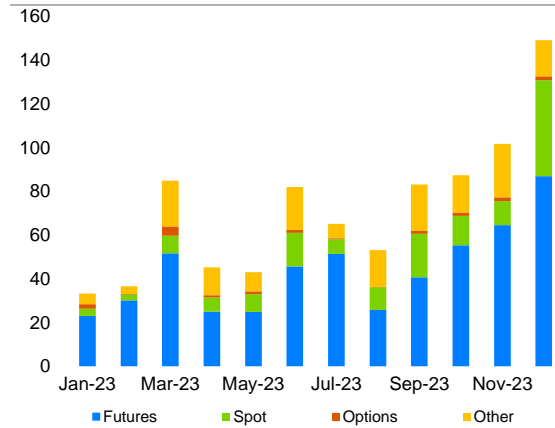
Note: Daily number of off-exchange buy transactions in EUA derivatives. 30-day moving average in green.
Sources: MiFIR, ESMA.

CMR.19
Daily volumes of transactions off-exchange
Peak in December



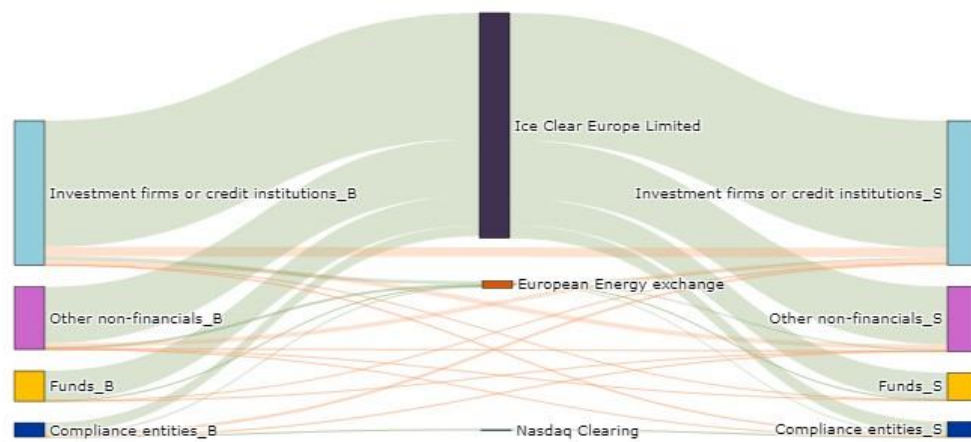
Note: Daily off-exchange trading volumes in EUA derivatives, in million of tonnes of CO2-equivalent emissions. 30-day moving average in orange. Sources: MiFIR, ESMA.

CMR.20
Off-exchange volumes by instrument type
Increase in spot trading in 2H23



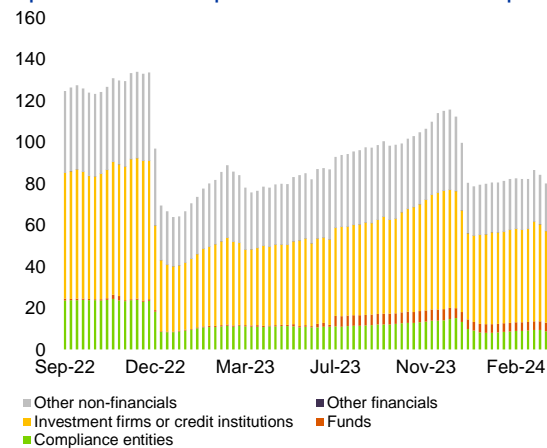
Note: Monthly off-exchange trading volumes by type of contracts, in million of tonnes of CO2-equivalent emissions. Sources: MiFIR, ESMA.

CMR.21
Sankey chart
Main actors: Investment firms, credit institutions, other financial entities



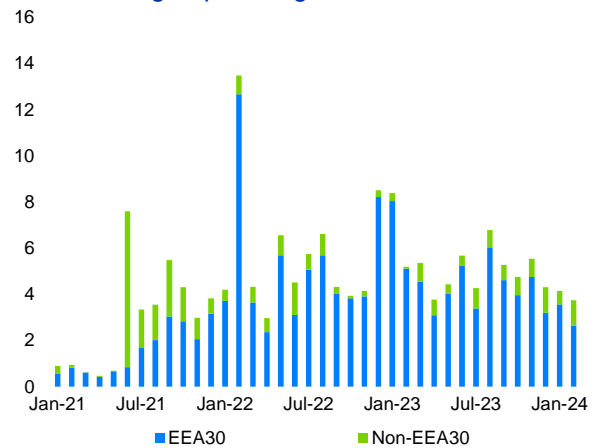
Note: Trading activity by counterparty sector on and off-exchange. Flows are proportional to tonnes of CO2 equivalent emissions exchanged. Orange lines represent off-exchange trading, while green lines are for on-exchange. _B indicates that the counterparty is in the buy leg of the transaction. _S indicates that the counterparty is in the sell leg of the transaction. Sources: MiFIR, ESMA.

CMR.22
Total notional outstanding by sector
Open interest drops when Dec contract expires



Note: Notional amounts outstanding by week and sector of the reporting counterparty, EUR bn. Intragroup trades are excluded. Sources: EMIR, ESMA

CMR.23
Notional amounts traded intragroup
Stable intragroup trading



Note: Monthly notional amounts traded intragroup by counterparty domicile, EUR bn. Only client reports included. Sources: TRs, ESMA.

Positions in EUA derivatives

Summary

Derivatives markets play an important function in the EU ETS by facilitating the acquisition of EUAs by compliance entities from financial intermediaries. Reflecting this, positions in EUA derivatives follow a regular pattern mirroring the annual compliance cycle of the EU ETS. The December contract remained the most traded in 2023. There were on average 406 funds holding around 6% of all EUA positions, with funds turning increasingly short through the year as EUA prices declined.

Derivatives positions cycle

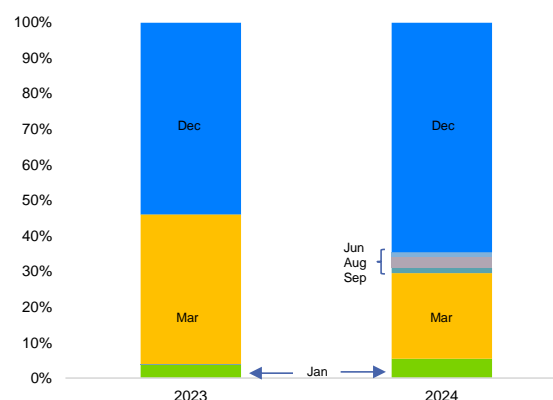
Positions in EUA derivatives follow a regular pattern reflecting the **annual compliance cycle** of the EU ETS. Compliance entities and other non-financials enter into a growing number of long futures positions through the year in anticipation of the EUA surrender date the following year. These positions are matched by a corresponding number of short futures positions held by investment firms and banks (CMR.29).

The number of positions usually peaks by mid-December in line with trading activity (see previous section) when the **most traded futures contract** (the 'next-Dec') expires. In 2023, the number of EUA positions peaked at 1.7 million on 15 December (CMR.25), including 650,000 positions in the Dec-23 contract. Some positions are rolled over upon expiry of the December contract, leading to an increase in the number of positions in other contracts with later expiry dates (CMR.26). Nonetheless, the total number of positions dropped to a low of 1.1 million end-December as many entities took delivery of the EUAs.

Up until now, the March futures contracts was typically used by compliance entities as a 'top-up'. This allowed them to acquire extra EUAs between the December contract expiry and the EUA surrender date in April to match their GHG emissions for the year just ended. However, with the surrender date moving to September from 2024, some of the liquidity appears to be shifting away: while the Mar-23 contract accounted for 42% of all derivatives positions on 1 January 2023, the Mar-24 contract accounted for only 24% on 29 December 2023. This is leading to higher concentration in the next-Dec contract but also to new positions in contracts due to expire in June, August and September (CMR.24).

CMR.24

Share of derivatives positions by contract expiry month
Liquidity shifted away from March contract



Note: Share of gross positions in EUA derivatives, by contract expiry date. 2023 positions as of 1 January 2023, 2024 positions as of 31 December 2023.
Sources: ICE Endex, EEX, Nasdaq Oslo, ESMA.

Position holders

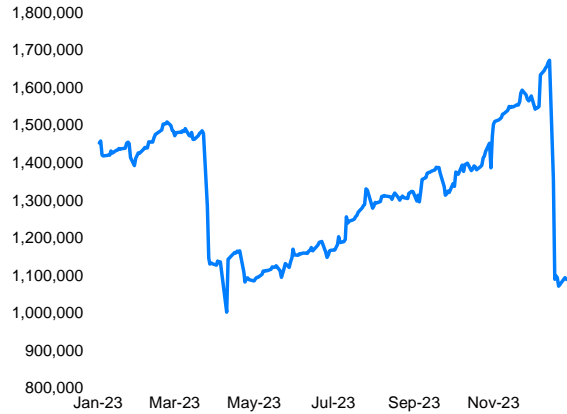
Derivatives markets play an important function in the EU ETS by facilitating the acquisition of EUAs by compliance entities from financial intermediaries. **Investment funds** tend to track more closely EUA price developments and turned increasingly net short in 2023 as prices declined (CMR.30). In 2023, on average 406 investment funds held daily positions, in line with the ESMA 2022 report. This compared with 206 compliance entities and other non-financials, and 118 investment firms and banks (CMR.27).

Within **non-financials**, German entities held 39% of positions. Funds held on average much smaller positions and accounted for only 6% of all positions held, compared with 53% for investment firms and banks (CMR.28). Around 75% of fund positions were held by managers domiciled in the Cayman Islands and Bermuda, while the US and UK accounted for 52% of positions held by investment firms and banks.

Key indicators

CMR.25

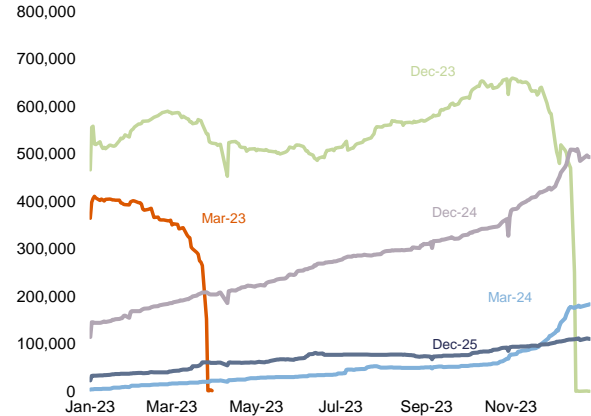
Number of derivatives positions
Positions increase until December contract expiry



Note: Daily number of positions in EUA derivatives in lots (1,000 allowances).
Sources: ICE Endex, EEX, Nasdaq Oslo, ESMA.

CMR.26

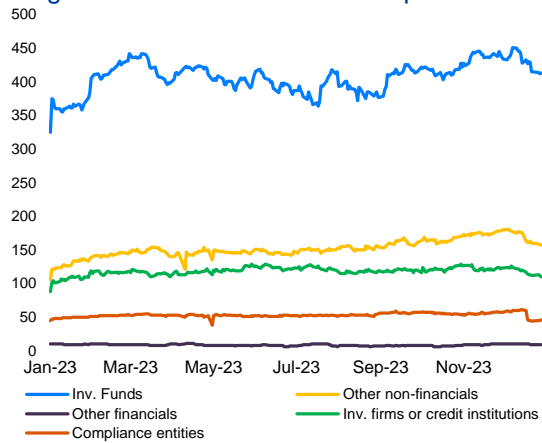
Number of positions in most liquid futures contracts
Next-December contract most traded



Note: Number of gross positions in EUA derivatives in lots (1,000 allowances), by contract expiry date.
Sources: ICE Endex, EEX, Nasdaq Oslo, ESMA.

CMR.27

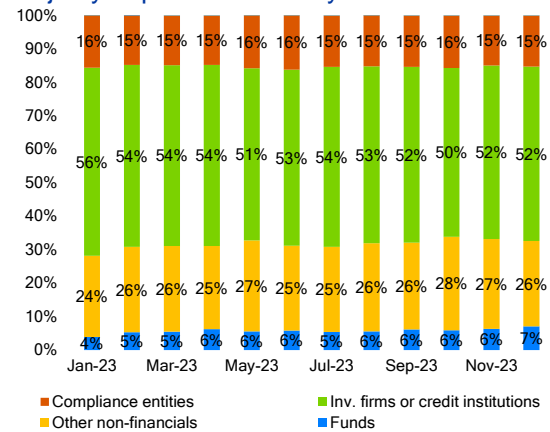
Derivatives position holders by sector
Large number of funds hold EUA positions



Note: Number of position holders in EUA derivatives, by counterparty sector.
Sources: ICE Endex, EEX, Nasdaq Oslo, ESMA.

CMR.28

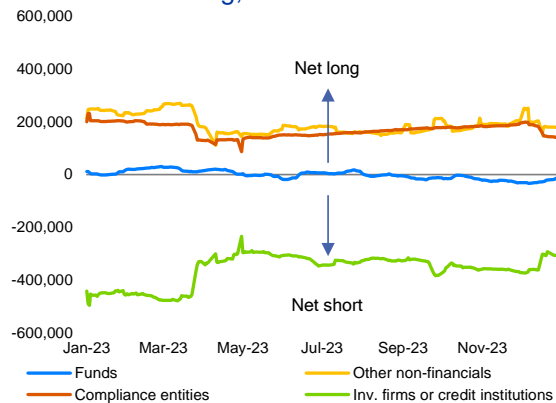
Share of derivatives positions by sector
Majority of positions held by banks and inv. firms



Note: Share of gross positions in EUA derivatives by counterparty sector.
Source: ICE Endex, EEX, Nasdaq Oslo, ESMA.

CMR.29

Net derivatives positions by sector
Non-financials long, banks and inv. firms short



Note: Number of net positions in EUA derivatives held by counterparty sector, in lots (1,000 allowances).
Sources: ICE Endex, EEX, Nasdaq Oslo, ESMA.

CMR.30

Net derivatives positions of investment funds
Funds turned net short in 2023



Note: Number of position in EUA derivatives held by funds, in lots (1,000 allowances).
Sources: ICE Endex, EEX, Nasdaq Oslo, ESMA.

Conclusion

Monitoring

Overall, in line with the ESMA 2022 report, the analysis has not unveiled any significant issue in the functioning of EU carbon markets.

Prices in the EU ETS have declined since the beginning of 2023, averaging EUR 83/tCO₂ during the year. This reflected a combination of lower demand for EUAs from weak industrial activity, falling natural gas prices and decarbonisation of the European energy sector, and increased supply following the decision to auction new allowances to finance the REPowerEU plan. Intraday and historical volatility measures remained low throughout the observation period.

The findings with respect to the organisation of the EU ETS market are also in line with ESMA's 2022 report. EUA primary markets remain significantly concentrated, with around 10 participants buying 90% of auctioned volumes, reflecting a preference by most EU ETS operators to source allowances from financial intermediaries. The vast majority of trading in secondary markets is done through derivatives, reflecting the annual EU ETS compliance cycle where non-financial sector firms hold long positions (for compliance purposes) while banks and investment firms hold short positions.

Reflecting this set up, most transactions are executed by banks or investment firms using standardised on-exchange futures, with financial sector trading in derivatives mainly undertaken by firms domiciled in the US and UK. The next December futures contract remains the most traded by far, with other traded maturities and spot trading typically used by non-financial sector entities to 'top up' EUA needs. Overall trading volumes increased around the expiry date of the most liquid contracts (in March and December), with the volumes of OTC transactions growing too, including increased activity in spot and

options trading. The elevated correlation between the number of OTC and on-venue transactions suggests some interconnection between on- and off-exchange markets.

Policy recommendations

The ESMA 2022 report included a list of policy recommendations to contribute to improving the transparency and monitoring of the EU carbon market. Most of these recommendations have been (either fully or partially) implemented. However, the availability of LEIs in the Union Registry to identify account holders remains quite limited, pointing to the need for additional efforts by national administrators to ensure the timely implementation of the LEI registration requirement. This is particularly relevant in 2024 as the number of account holders will increase due to the expansion of the EU ETS to additional sectors.

Overall, no major new issues have been raised from a policy perspective when preparing this report, although further analysis on additional aspects may be warranted in the future as ESMA plans to continue monitoring the carbon market developments. In the context of the MiFIR review, ESMA will publicly consult on the revision of RTS 22 for improving the reporting of transaction data. As outlined in the data handling section (see next page), the identification of transaction chains remains problematic, and the trading strategies were subject to price adjustments to perform more accurate analysis. Therefore, the consultation will also seek advice from the industry whether there is the need to further clarify the reporting of the strategies and transaction chains. Following this revision, ESMA invites the Commission to duly consider the aspect of transaction chains when adopting the revised RTS 22 to be submitted by ESMA, given the implication it will have also for Carbon Markets.

Annexes

Data sources

To provide a comprehensive picture of carbon markets in the EU, this report makes use of multiple data sources. The first section on price and volatility makes use of public and commercial data. The second section use auctions data from the European Energy Exchange and collected by BaFin in accordance with Article 34 of the Auctioning Regulation¹⁹.

The sections on trading and on derivatives positions leverage (1) regulatory position data reported by EU trading venues under Article 58 of the Markets in Financial Instruments Directive (MiFID II) (2) regulatory transaction data reported under Article 26 of the Markets in Financial Instruments Regulation (MiFIR) and (3) regulatory transactions data reported by derivatives market participants under the European Market Infrastructure Regulation (EMIR). The scope, objectives and structure of the information reported under these regulatory reporting regimes differ, and the indicators featured in the report have been selected to provide readers with the most accurate depiction of secondary markets.

Where relevant, regulatory data have been enriched with external information, e.g. Legal Entity Identifiers (LEIs) from the Global LEI foundation.

Counterparty classification

Due to the multitude of datasets with different reporting scopes and contents used for this report, ESMA has developed a unique counterparty classification system. The classification builds on the one used in the MiFID II weekly derivative position reports and was further refined through consistency checks between datasets and manual look ups. Each counterparty is identified by its LEI and allocated to one of the following categories:

- Compliance entities;
- Other non-financials;
- Investment firms or credit institutions;

- Other financials;
- Funds; or
- Unclassified.

Compliance entities thereby represent firms with compliance obligations under the EU ETS and investment firms and credit institutions must be authorised as such and are identified through public registers.

It is important to note that the classification is performed on a legal entity level and corporate groups can comprise multiple differently classified entities. For example, “other non-financials” that are active in the carbon market are often part of a larger corporate group with compliance obligations, and usually represent their dedicated trading arms. However, the category of “other non-financials” also includes commodity trading firms that do not qualify as financial firms and without compliance obligations of associated entities.

Data handling

ESMA screened and cleaned the data to ensure its accuracy for analysis. Firstly, ESMA identified and removed cancelled and duplicated transactions, retaining only pertinent data. Additionally, outliers identified in the “quantity” and “price” fields, caused by misreporting, were corrected to enhance the overall quality of the dataset.

Secondly, to perform more accurate monetary values for the trading strategies reported with the delta prices, ESMA adjusted the strategy prices based on the most recent transactions involving the same instrument.

Lastly, ESMA mapped the Classification of Financial Instruments (CFI) using either the code reported in the Financial Instruments Reference Data System reference data or in MiFIR transactions data. This mapping facilitated further analysis and classification of the different categories of instruments in compliance with the CFI ISO 10962.

OTC trading is identified through the 'Venue' and 'Transmission of Order Indicator' fields.

¹⁹ Commission Delegated Regulation (EU) 2023/2830 of 17 October 2023 supplementing Directive 2003/87/EC of the European Parliament and of the Council by laying down rules on

the timing, administration and other aspects of auctioning of greenhouse gas emission allowances.

Subsequently OTC transactions are deduplicated by buyer ID, seller ID and timestamp. This approach is also intended to partially remove the duplicate reports originating from transaction chains which could be identified (for further details on the issue of transaction chain identification, see the ESMA 2022 report). Total OTC trading activity is then calculated as the aggregate volumes of the corresponding transactions.

