# The EUA Market

## Characteristics, future drivers and the impact of withholding allowances from the market

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# Executive Summary

In this report, we review the EUA market, the historic and future price developments as well as its key drivers, and look at the impact of temporarily withholding allowances from the market

**Key points**

- The EU ETS has a stable primary market grossing €16.64bn in 2019, and a growing secondary market sized at €154bn in 2019
- The secondary market is dominated by the Intercontinental Exchange (ICE) and has developed a liquid futures market
- EUAs show low correlation to other asset classes, but there is an increasing correlation to equity markets recently as more financial actors trade EUAs
- EUA prices lingered around low levels in most of last decade, until two reforms reduced the allowance surplus and created a resilience mechanism to counter future shocks – this ignited confidence, and prices have almost quadrupled over the last 3 years
- While returns were high, the EUA market is volatile (roughly 50% annualised volatility), and exhibited a 41% drawdown on the back of Covid-19 (which recovered within 69 days)
- We expect prices to rise to the €45-55/tonne range by 2025, and - depending on the implementation of the Green Deal – to rise above €80/tonne by 2030 or retreat back to around €35/tonne.
- Modelling the temporal withdrawal of allowances from the market shows that despite the temporal nature of the intervention, there is a lasting emission reduction effect:
  - Depending on the holding period, the emission reductions triggered can exceed the volume of allowances withheld
  - Emission reductions are triggered by the MSR permanently withdrawing allowances from the market
  - We find that even though allowances are sold back to the market, the second order benefit of lasting emission reductions persist

| Volume withheld [million allowances] | Duration [years] | Average price delta [€/tonne] | Allowances withdrawn [million allowances] | Emissions reduced [million tonnes CO2e] |
|---|---|---|---|---|
| 10 | 4 | €0.23 | 8.68 | 9.30 |
| 10 | 9 | €0.59 | 15.94 | 19.19 |
| 100 | 4 | €1.33 | 78.65 | 92.84 |
| 100 | 8 | €3.19 | 137.67 | 198.97 |

# 1 Introduction

The EU Emissions Trading Scheme (EU ETS) was established in 2005 to support the delivery of the EU's carbon reduction target. It is the largest cap and trade scheme globally with a 2020 cap of 1.8Gt CO2e.

This report focusses primarily on the EU ETS as a market (For a good overview on the environmental effectiveness, see e.g. *Bayer and Aklin* (2020)). The compliance instrument in the EU ETS is an EU Allowance (EUA), which is issued by the European Commission on behalf of the member states. Since inception of the market some 15 years ago, the primary and secondary market for EUAs has developed significantly, including a liquid futures and options market.

This report will look into the market in 3 stages:

First, we review the pure market characteristics of EUAs: Trading volumes, liquidity, pricing and correlation to other asset classes.

Second, we introduce the ICIS Timing Impact Model, our proprietary market model that was developed for the unique characteristics of emissions trading. We discuss expected price drivers in the next decade and use our market model to quantify their effect in different price scenarios.

Last, we look at how temporarily withholding EUAs from the market affects prices and emissions in the EU ETS.

We do not cover a general introduction to the EU ETS and its history. For starters in this field, we recommend:

- *EU ETS Factsheet* by the European Commission (from 2016)
- ICAP's *EU ETS Factsheet* (from 2020)

# 2 Current Market Characteristics

In this section, we review the primary and secondary market, look at key players and calculate correlations to other asset classes

## 2.1 The primary EUA market

The EUA market has developed both a liquid primary and secondary market, worth €169bn in 2019 according to *Refinitiv*. While the secondary market was very liquid for a long time, the primary market saw a boost once the distribution of free allocation to stationary installations was significantly cut in 2013, and instead the allowances were auctioned. Since 2013, the primary method of allocating the cap is via auctioning of allowances.

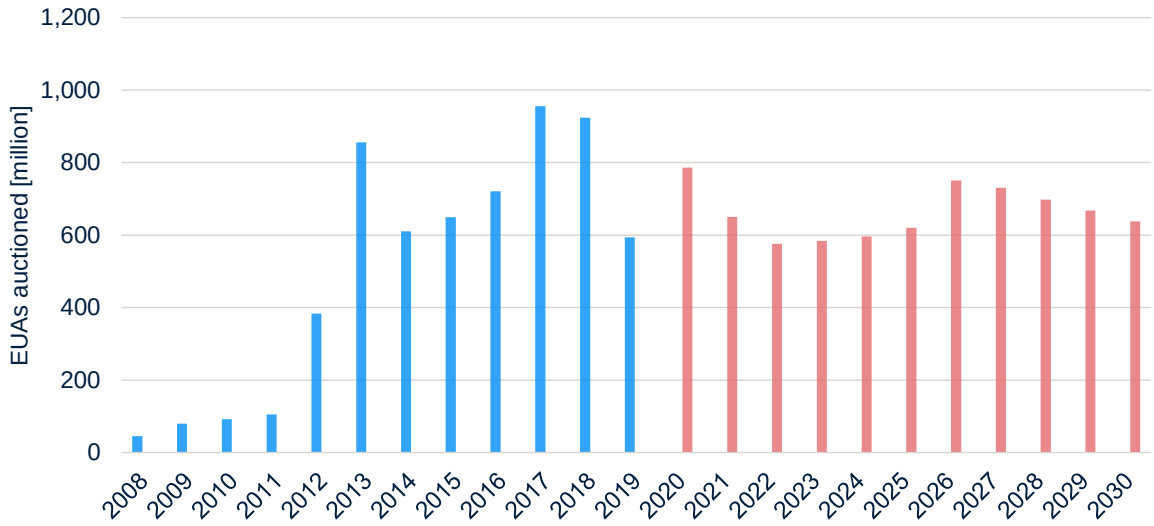
Generally, the primary supply of allowances is set by regulation: A certain share of the total allowances is allocated free of charge to operators, other EUAs are transferred to reserves or earmarked for supporting specific funds (innovation, modernisation, etc.), and the remainder is sold through auctions.

Auctions are run by appointed auction platforms (currently EEX and ICE), and run almost daily at 11AM CET. They vary slightly by volume, most notably auction volumes are reduced 50% during August (to account for holiday season) and there are no auctions held late December and early January.

Statistics and other data on the auctions can be found *here*.

Overall, the EU ETS has generated €50.54bn of revenue for governments since inception, of which €16.64bn were collected in 2019 (*ICAP*).

**Chart 1: Annual auction volumes in the EU ETS (as of 2020: forecasted, Base Case scenario)**




Source: ICIS

Since 2013, auction volumes are increasing steadily as the amount of allowances handed out for free reduces significantly, while the overall allowance supply drops by only 1.74% annually. As of 2019, however, the Market Stability Reserve has curbed auction supply, and will continue to do so going forward.

## 2.2 The Market Stability Reserve

In October 2015, the EU introduced a *Market Stability Reserve* (MSR), which introduces a new dynamic to the auction volume calculation: The MSR is designed to keep the overall market balance between an upper (833m) and lower (400m) threshold. The market balance is defined as all allowances (and offsets) issued, minus all verified emissions since 2008. This balance stood at around 2bn allowances in 2013, mainly because of significant emission reductions triggered by the financial crisis. This supply overhang risked the environmental effectiveness of the scheme, so that the regulator created the MSR as a resilience mechanism:

1. Every year, the market balance is calculated and published in May (the most *recent publication* in 2020 assessed the market balance at 1,385m allowances)
2. Thereafter, auction supply over the next 12 months (starting 1st September) is adjusted:
   a. If the market balance exceeds 833m allowances, 24% (12% as of 2024) of the surplus is withdrawn from auction volumes and placed in the MSR.
   b. If the market balance is below 400m allowances, 100m allowances are released from the reserve each year and sold in addition to the regular auction volume
3. As of 2023, allowances held in the MSR above the previous year's auction volume will be permanently cancelled

## 2.3 The secondary EUA market

EUAs are traded in spot, forward and future markets, with the vast majority of trading (95%) happening on exchanges. Since EUAs are highly standardised and digital goods without almost no difference in quality, they are a perfect commodity for exchange trading. Since 2018 they are classified as financial instruments and thus are covered by MiFID2 rules.

### Table 1: EU ETS trading volumes by segment

| | 2016 | | 2017 | | 2018 | | 2019 | |
|---|---|---|---|---|---|---|---|---|
| | Mt | € million | Mt | € million | Mt | € million | Mt | € million |
| EUAs Auction | 724 | 3 778 | 934 | 5 366 | 916 | 14 090 | 589 | 14 503 |
| EUAs exchange traded | 4 173 | 22 516 | 3 830 | 23 263 | 5 977 | 101 778 | 5 823 | 145 231 |
| EUAs OTC | 230 | 1 203 | 352 | 2 175 | 845 | 13 670 | 360 | 9 094 |
| Aviation EUAs | 7 | 35 | 5 | 4 | 6 | 104 | 6 | 137 |
| **Total** | **5 134** | **27 541** | **5 122** | **30 840** | **7 764** | **129 642** | **6 778** | **168 965** |

Source: Refinitiv

The ICE and EEX are the dominant market places for EUA spot and futures trading, with ICE taking up 97% of secondary exchange traded market volume in 2019. We, therefore, focus our liquidity analysis on the ICE EUA market only.

On average, this year ICE traded 32m allowances, or roughly €800m on a daily basis across its EUA futures, and about 2.5m spot EUAs (€60m) per day. End of September 2020, the total Open Interest stood at around 1bn allowances, roughly 2/3 of the EU ETS annual allowances.

Looking at resilience, we find that trading volumes increase significantly with larger price swings, see Table 2

### Table 2: Average daily trading volume in 1,000 allowances on days with different price swings since Jan 2013 in ICE Front year EUA contract

| Daily price change | 0-1% | 1-2% | 2-3% | 3-4% | 4-5% | 5-6% | 6-7% | 7-8% | 8-9% | 9-10% | >10% |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Average volume | 11,915 | 12,800 | 15,354 | 16,207 | 16,873 | 20,712 | 21,653 | 24,558 | 24,950 | 22,445 | 33,789 |
| # days | 619 | 494 | 328 | 177 | 98 | 80 | 46 | 28 | 22 | 10 | 28 |

Source: ICIS, Intercontinental Exchange (ICE)

Another way at looking at efficiency is to compare the primary auction results with the secondary market. Since 2014, the daily auctions have cleared on average €0.01 (or 0.07%) below the front month secondary market price at the same time. Table 3 lists the range over the last 5 years

### Table 3: Delta between auction clearing price and secondary market price at time of auction settlement

| | | |
|---|---|---|
| 2015 | € 0.02 | 0.28% |
| 2016 | -€ 0.01 | -0.25% |
| 2017 | -€ 0.01 | -0.10% |
| 2018 | -€ 0.03 | -0.17% |
| 2019 | -€ 0.01 | -0.05% |
| 2020 | € 0.00 | -0.02% |

Source: ICE, European Energy Exchange (EEX), ICIS

## 2.4 Correlation to other asset classes

EUA represent a largely uncorrelated asset class to other existing groups of assets. We have calculated the correlation of EUA returns against bonds, equities, commodities and real estate in Table 4 and 5. Overall correlation is loose across asset groups. That being said, there is a trend of growing correlation to equity markets over the last years, which we interpret as a signal of increasing maturation of the market. The 2020 values should be consumed with caution as the Covid shock to global markets has created a (hopefully!) unique price reaction across all asset classes.

**Table 4: Correlation of daily returns against EUA spot price**

| | | YTD | 1 year | 3 year | 5 year | since inception |
|---|---|---|---|---|---|---|
| Bonds | 10yr BUND | 1.26% | -0.41% | -0.78% | 0.55% | 0.92% |
| | 10yr US Treasuries | 13.61% | 15.04% | 11.18% | 8.94% | 4.92% |
| Equities | MSCI World | 50.92% | 49.19% | 29.79% | 25.81% | 17.93% |
| | S&P 500 | 46.88% | 45.23% | 26.33% | 22.64% | 15.15% |
| | EuroStoxx 50 ($) | 49.73% | 48.78% | 30.13% | 29.31% | 20.54% |
| Commodities | Coal (API2) | 14.10% | 12.77% | 14.15% | 17.49% | 13.93% |
| | Natural Gas (Henry Hub) | 28.19% | 25.46% | 11.21% | 7.35% | 7.67% |
| | Gold | 25.75% | 20.85% | 7.32% | 5.22% | 1.92% |
| | WTI | 30.50% | 28.62% | 19.95% | 21.88% | 17.23% |
| | S&P GSCI | 46.65% | 43.91% | 28.72% | 28.81% | 21.56% |
| Real Estate | MSCI US REIT | 51.99% | 48.72% | 25.61% | 19.19% | 17.91% |

Source: ICIS

**Table 5: Correlation of daily returns against EUA spot price**

| | | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 |
|---|---|---|---|---|---|---|---|---|
| Bonds | 10yr BUND | -5.31% | 8.13% | -4.01% | 2.65% | 17.90% | 8.86% | -2.84% |
| | 10yr US Treasuries | 22.73% | 0.60% | -11.74% | 12.69% | 0.96% | 2.96% | -9.35% |
| Equities | MSCI World | 16.77% | 6.48% | 3.16% | 30.57% | 6.91% | 4.85% | -0.31% |
| | S&P 500 | 17.57% | 1.59% | 4.80% | 24.22% | -2.27% | 5.12% | -1.21% |
| | EuroStoxx 50 ($) | 19.77% | 8.56% | 22.90% | 33.63% | 23.77% | 5.13% | 2.73% |
| Commodities | Coal (API2) | 20.11% | 10.07% | 29.31% | 22.32% | 9.21% | 7.42% | 10.77% |
| | NatGas (Henry Hub) | 6.03% | -2.82% | -2.15% | -1.25% | 26.31% | 7.15% | 5.51% |
| | Gold | -3.93% | 0.81% | 3.80% | -5.44% | -2.82% | -0.54% | -2.06% |
| | WTI | 13.44% | 9.57% | 15.60% | 35.01% | 23.38% | 3.16% | 10.40% |
| | S&P GSCI | 18.78% | 10.44% | 14.33% | 38.05% | 19.82% | 0.79% | 14.25% |
| Real Estate | MSCI US REIT | -8.33% | -4.47% | -0.84% | 7.30% | -0.67% | | |

Source: ICIS

# 3 Historic price performance

EUA spot prices (we use the ICE P3 daily future) have shown significant changes since the start of the EU ETS' 3rd trading period in 2013.

**Chart 2: Historic EUA price developments**


Source: ICE; ICIS

Initially, the EU ETS was oversupplied as the financial crisis had wiped out significant amount of emissions without the supply of allowances being adjusted. This oversupply of allowances stood at ~2bn tonnes, which is more than the total annual emissions of the EU ETS at that time. Consequently, prices lingered around $5/tonne in 2013. The European Commission reacted with two reforms:

1. "Back-loading": End of February 2014, the EU enacted a temporal shift of auction supply to reduce the surplus of allowances in the market. By withholding 900m allowances from auction in 2014-2016, the surplus of allowances was reduced in the market. The proposal planned that allowances would enter the market in 2019 and 2020 again. However, this was later overruled by the second reform:
2. "Market Stability Reserve" In 2015, the EU introduced a resilience mechanism as described in section 2.2 that automatically adjusts auction volumes if emissions are changed due to external factors and therefore keeps the market balance within certain thresholds.

The first reform had a minor price impact: After a spike in early 2014 around the enactment, prices traded rangebound, however with a modest positive trend over 2014 and 2015. Thereafter, the fading effect of backloading and overall grim markets caused prices to drop back to $5/tonne levels.

With the looming start of the MSR in 2018, companies started to build stocks and external investors (mainly hedge funds) bought EUAs and thus increased prices as of mid-2017. With rising prices came more fear of future supply shortages, leading to more hedging and position building. Together with reduced auction supply in 2018 (triggered by the MSR), prices almost tripled in 2018.

After a volatile 2019 with modest gains, the surging global attention to combating climate change, coupled with the new European Commission's focus on a "Green Deal" fuelled optimism about a more ambitious EU ETS going forward, so that prices increased again. The Covid pandemic did  impact markets only for a few days: As the MSR will curb supply to balance for the lower emissions, the fundamentals are not significantly affected, and the focus on a green recovery sent prices to new heights.

**Table 6 summarises key metrics since 2013**

| | YTD | 1 year | 3 year | 5 year | since inception |
|---|---|---|---|---|---|
| Returns | | | | | |
| Cumulative | 16.20% | 14.96% | 287.06% | 244.90% | 274.65% |
| Annual | 18.71% | 14.96% | 142.12% | 119.62% | 112.24% |
| StdDev daily returns | 3.52% | 3.27% | 3.00% | 3.11% | 3.40% |
| StdDev annualised | 55.85% | 51.84% | 47.67% | 49.29% | 53.99% |
| Sharpe Ratio against US 3mo treasuries | 0.19 | 0.04 | 0.65 | 0.26 | 0.18 |
| Max drawdown | | | | | |
| Drawdown | 41% | 44% | 44% | 44% | 44% |
| Recovery daycount | 69 | 90 | 90 | 90 | 90 |
| Calmar ratio | 2.19 | 2.94 | 0.31 | 0.37 | 0.39 |

Source: ICIS

# 4 Future Price Expectations

## 4.1 The Timing Impact Model

At ICIS we have developed a proprietary cap and trade market model that is custom made for the unique characteristics of emission trading schemes. Since storage costs are virtually zero and companies can even borrow allowances from future allocations, the date of the CO2 emissions is largely irrelevant when calculating time series for allowance demand.

Instead, our model calculates the allowance demand traded in the market by looking at behaviour of companies: Utilities hedging their power generation assets, industrial companies selling surplus allowances or building stocks and speculators entering the market temporarily.

This model is backed by empirical data back to 2005 and acknowledged by the market as the most accurate way of mirroring market dynamics. Amongst others, it was used in October 2015 by the European Commission to inform the EU Parliament about the market dynamics.

## 4.2 Key drivers for EUA prices

Fundamentally, prices are determined by supply and demand. When it comes to emissions trading, both sides are (in the short term) pretty price inelastic: On the demand side, there are only two short term options to reduce emissions: Switch from a carbon intensive to a less carbon intensive fuel for power and heat generation (so called “fuel switching”), or reduction throughput/stopping a plant overall. In the longer term, more and more abatement opportunities become viable that are typically listed in a marginal abatement cost curve (“MACC”), which introduce more price elasticity to demand.

On top of the fundamental demand (the emissions), we overlay behaviour, in particular

1. How far out the utilities hedge their power generation,
2. How industrial companies act around their free allocation (selling or building stocks) and
3. how speculators trade (mainly on technical indicators)

The supply is largely price inelastic, as the overall amount of allowances available does not react to prices at all, and auction volumes are also fixed unrelated to the price. The only supply side price elasticity is introduced by either compliance players selling excess allowances or speculators.

#### 4.2.1 Fundamental emissions trends

Fundamentally, GDP developments and the expansion of renewable energy are key drivers for underlying emissions. We use Oxford Economics growth rates and have our own internal fundamental power market model to forecast generation trends for all EU ETS participating countries. Within this power market model, we simulate market based investments into renewable energy as well as assumes subsidy driven build-out of renewable power generation assets (based on the National Renewable Energy Action Plans of EU members states). We then use our proprietary MAC-Curve to deploy additional fundamental abatement based on carbon prices and assumed technical progress.

Industrial installations and the aviation industry receive free allocation of allowances to soften the cost effect and prevent carbon leakage. Historically, these free allocations often exceeded actual emissions on company basis, rendering these companies "long EUAs". Most of these companies sold this excess and generated significant windfall profits Table 7 shows the net short position by sector in the 3rd trading period from 2013 to 2020 (negative numbers indicate excess allowances). Note the sharp drop in 2020 due to the Covid-19 pandemic across all sectors, which we expect to rebound in 2021.

In Table 8 we list our forecast for net short positions by sector for the next decade. The ongoing decline in power & heat emissions is driven by the expansion of renewables and additional phase-out regulation on especially coal and lignite fired power generation in nearly all European countries.

**Table 7: Net short positions by sector (Emissions – free allocation)**

| [in Mt] | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| Power & Heat | 842 | 795 | 824 | 805 | 824 | 779 | 662 | 553 |
| Cement & Lime | -28 | -10 | -10 | -9 | -1 | 4 | 4 | 2 |
| Metals | 10 | 20 | 23 | 19 | 32 | 37 | 28 | -9 |
| Oil & Gas | 47 | 45 | 55 | 58 | 64 | 62 | 66 | 56 |
| Chemicals | 14 | 15 | 17 | 19 | 23 | 24 | 22 | 25 |
| Pulp & Paper | -4 | -4 | -2 | -1 | 0 | 1 | 1 | 0 |
| Ceramics & Glass | 0 | 1 | 2 | 3 | 4 | 5 | 5 | 3 |
| Other | 13 | 12 | 14 | 17 | 20 | 21 | 22 | 23 |
| Aviation | 21 | 23 | 25 | 30 | 31 | 34 | 35 | 5 |
| **Total** | **916** | **897** | **949** | **940** | **998** | **968** | **846** | **657** |

Source: ICIS

**Table 8: Forecasted net short positions by sector**

| [in Mt] | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|
| Power & Heat | 595 | 552 | 529 | 517 | 484 | 504 | 498 | 490 | 476 | 442 |
| Cement & Lime | 44 | 47 | 49 | 51 | 52 | 31 | 31 | 29 | 25 | 19 |
| Metals | 15 | 16 | 17 | 15 | 14 | 6 | 4 | 0 | -6 | -14 |
| Oil & Gas | 72 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 72 | 70 |
| Chemicals | 16 | 17 | 17 | 18 | 18 | 25 | 25 | 25 | 22 | 18 |
| Pulp & Paper | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | -1 | -1 |
| Ceramics & Glass | 12 | 13 | 13 | 14 | 14 | 12 | 12 | 13 | 13 | 13 |
| Other | 30 | 31 | 32 | 32 | 32 | 31 | 32 | 33 | 34 | 34 |
| Aviation | 27 | 34 | 39 | 41 | 43 | 45 | 47 | 49 | 51 | 52 |
| **Total** | **814** | **785** | **771** | **762** | **731** | **727** | **722** | **711** | **686** | **633** |

Source: ICIS

So overall, GDP growth and carbon intensity developments are key drivers for fundamental emission positions. However, as GDP shocks are softened by the MSR and carbon intensity trends move slow, these two trends impact prices only over long time periods and make this category ironically the least relevant driver of price changes.

#### 4.2.2 Compliance company behaviour

As mentioned before, given the unique characteristics of cap and trade markets, we incorporate behaviour (hedging, selling and stock building) in our modelling.

**Utilities:**

Conventional power generation assets are hedged out for several years by buying the underlying fuels and selling the generated power. The more liquid the curves are, and the more hedge appetite the companies have, the further out generation is hedged. Generally, lignite plants are hedged out longest (up to 5 years in advance), followed by coal and gas fired generation (typically hedging starts 3 years before production). There are, however, regional differences as e.g. Eastern EU power markets are less liquid or the wholesale market is regulated (partially fixed prices).

Consequently it is key to understand the hedge behaviour of western EU utilities with high carbon intensity to forecast then demand actually traded in the market. In cases of economic turmoil, utilities tend to extend their hedge ranges as this secures revenues and in turn creates a “predictability premium” for their corporate ratings. Note that a slowdown or even decrease in hedging can lead to selling of EUAs from these companies during a certain period.

**Industry:**

The industry was historically well equipped with free allowances, so that they were able to act as net sellers in the market. However, with rising prices more and more companies stopped selling over the last years and started to build stocks. Over time, industrial companies are becoming net buyers as their free allocation decreases and their stocks run out. Again, companies apply different purchase patterns, depending on their size, market access and financial capabilities. While large corporates such as the Oil&Gas majors, Chemicals, Metals and Cement producers apply sophisticated hedging strategies, smaller companies tend to buy ad hoc and lag market developments.

Company behaviour was a key driver for short term prices for much of the last decade, but by now is of medium relevance. It is still key to determine actual compliance demand, but not the main driver of market developments in the recent months.

#### 4.2.3 Speculation

The EUA market is perfect for speculation: Highly standardised, liquid, little transaction costs and very volatile. The large compliance players, in particular utilities and Oil&Gas majors trade around their compliance position with a spec book and are able the generate high returns as they have some market power and good market knowledge and data. In addition, trading houses are taking speculative short and mid-term positions to benefit from market trends.

Since 2017, we see an emerging class of long-term speculators: Hedge funds entered the market to take long-term positions, betting on increasing allowance prices. In contrast to other speculators, they seem to be less vulnerable to short term price drops so that they hold on to their position despite e.g. a 40% drop in EUA prices during the COVID 19 crash in March 2020.

We estimate that hedge funds currently hold 75-100m EUAs, and future price trends will be impacted by the development of this position.

#### 4.2.4 Supply of allowances

The biggest driver for prices recently is the change around allowances made available to the market. The total amount of EUAs available in a given year is a result of multiple layers:

**The cap**

First, the “cap” determines the total amount of allowances available. The cap is equal to the annual emissions target. The EU has set an emission reduction target of “at least” 40% by 2030, and currently discusses to raise

this target to 55% emission reduction compared to 1990 levels as part of their Green Deal. It is currently unclear how this overall goal would be translated to the EU ETS cap (note that the EU ETS covers 43% of the EUs emissions only), but we expect the EU ETS to deliver 58% reduction compared to 2005 levels. This would translate into an annual decline of the cap of 5.2% (currently 2.2%) as of 2026.

In addition, there is a discussion emerging around how to handle coal phase outs in member states (e.g. Germany). Generally, there is a mechanism to cancel allowances that correspond to these phase outs, but it is at the discretion of the member state to trigger this. The German debate is currently overall in favour of such cancellation, but not decided yet and subject to the overall results of the negotiations around the Green Deal.

**Free allocation**

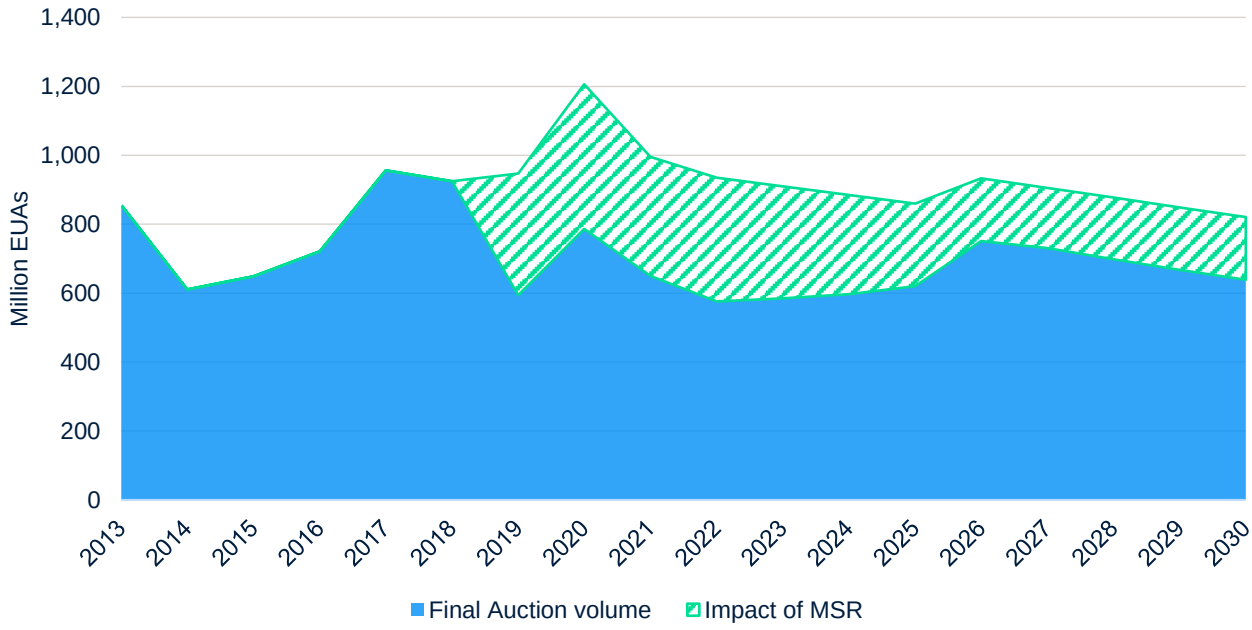
Once the cap is set, allowances are handed out either free of charge as free allocation or sold via auctions (during 2013-2020, 57% of allowances are sold in auctions, and the rest is allocated free of charge). Over the next decade, this share of freely allocated allowances continues to decline, but carbon leakage exposed industry will continue to receive some free allocation.

**Auctions**

The remaining volume is generally sold in auctions. However, the Market Stability reserve significantly changes the supply of allowances available for auctioning as described in 2.2. The mechanism is due to be reviewed in 2021, and there are two aspects of the reserve under scrutiny:

1. The thresholds for the market balance (called “TNAC”) are currently set at 400-833m allowances. However, with declining fossil-fuelled power generation, the utility hedge demand reduces significantly: Not only do emissions go down, but also the hedge horizon shrinks, resulting in less need of excess EUAs. Consequently, there will be a debate about lowering the thresholds, and we assume that the range will be halved to 200-416m
2. The intake rate is currently set at 24% of the TNAC, but is due to drop to 12% as of 2024. The regulator ponders to extend the 24% intake rate to the rest of the decade, and we see this as likely

**Chart 3: Impact of MSR on auction volumes**




Source: ICIS

For the next few years, the debate around the carbon reduction targets in the EU, and the implementation through the EU ETS as well as the MSR will drive prices. Currently, the debate is generally bullish for carbon prices: A higher annual decline in the cap as of 2026 and lower MSR thresholds combined with an extension of the 24%

intake rate should drive prices higher. Any changes around these positions will have a significant impact on short, mid- and long-term prices.

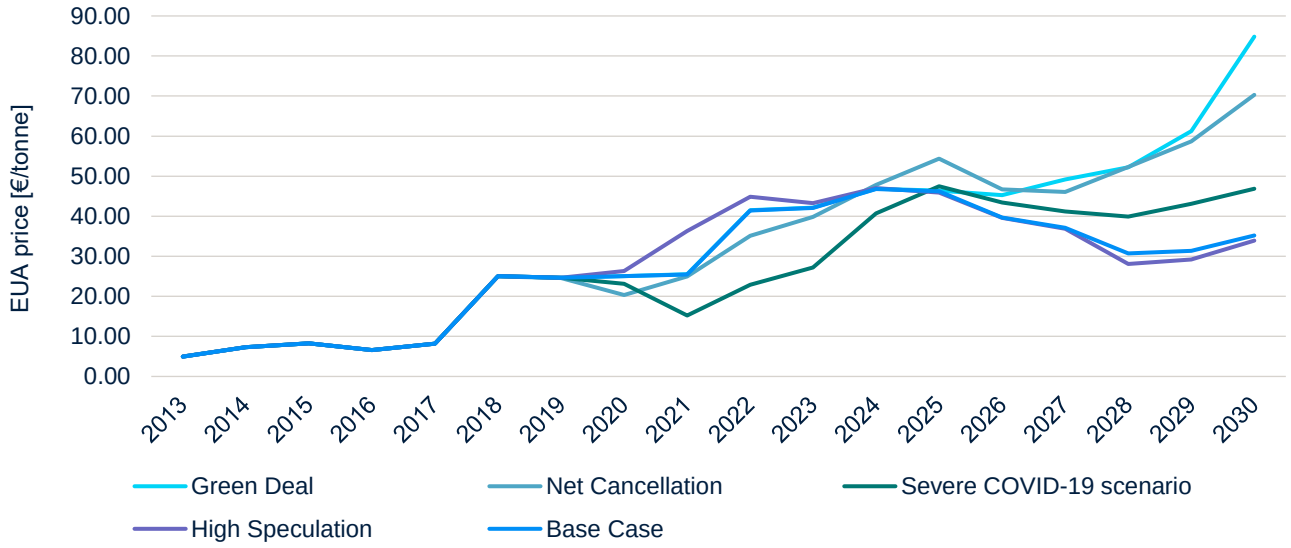
#### 4.2.5 Scheme expansion

Last, the EU currently debates to extend the EU ETS to other sectors, mainly marine transport, buildings and road transport. While some member states are keen to expand the EU ETS coverage, we are sceptical about the actual implementation. Our Base Case consequently assumes that no additional sectors would enter the EU ETS. While the market would undoubtedly get bigger (almost a doubling of covered emissions), the impact on prices would depend on the cap expansion and the behaviour of covered entities.

## 4.3 Price forecasts

To account for each of the key drivers outlined above, we have defined several scenarios that show the impact of different assumptions.

### Chart 4: Price forecasts for various scenarios




Source: ICIS

### Table 9: Scenario description

| MSR review | EUA cancellation | LRF change | Speculation | Linkage |
|---|---|---|---|---|
| **Base Case** | | | | |
| Yes, MSR reviewed. 400\|833 + 24% until 2023; 200\|416 + 24% from 2024 | No | No | Base | UK-EU ETS linkage after UK withdrawal agreement extension |
| This scenario is used as a benchmark to compare all scenarios below to it. The new MSR parameters from 2024 for this scenario (and all scenarios below) are set to enable a clear EUA price comparison without the TNAC dynamics (i.e. No MSR triggered) affecting it. Once a the MSR review is underway and potential policy options emerge, we will update our Base scenario accordingly. | | | | |
| **Green Deal** | | | | |
| Yes, MSR reviewed. 400\|833 + 24% until 2023; 200\|416 + 24% from 2024 | No | Yes. 4.2% from 2026 | Base | UK-EU ETS linkage after UK withdrawal agreement extension |
| This scenario assumes an LRF change from 2026 and to 4.2% from 2.2% currently. This new LRF would emerge from a new 2030 EU CO2 target of 50%, the lower range of the 50-55% target increase currently being analysed by the Commission. The start date of 2026 avoids a disruption of cap change in the first 2021-2025 period but translate into a steeper emissions reduction curve end of TP4. | | | | |
| **Net Cancellation** | | | | |

| | | | | |
|---|---|---|---|---|
| Yes, MSR reviewed. 400\|833 + 24% until 2023; 200\|416 + 24% from 2024 | Yes. All EU MS cancel EUA auctions for national coal phase out (Table 2) | No | Base | UK-EU ETS linkage after UK withdrawal agreement extension |
| This scenario assumes EU member states closing coal power plants to cancel five years equivalent of net emissions for the plants closed. "Net" in this context points to the emissions avoided by closing lignite and hard coal plants, accounting for additional generation (mainly gas) incentivised by such closures. | | | | |
| High Speculation | | | | |
| Yes, MSR reviewed. 400\|833 + 24% until 2023; 200\|416 + 24% from 2024 | No | No | High | UK-EU ETS linkage after UK withdrawal agreement extension |
| This scenario assumes that speculators anticipate an EU Green deal in the mid-term and hence start securing long positions in 2020 without waiting for further legislative clarity. In the Base scenario, speculators also take long positions in the market ahead of a short market after 2020 but do not front buy neither as early nor to the same magnitude. | | | | |
| Severe COVID-19 | | | | |
| Yes, MSR reviewed. 400\|833 + 24% until 2023; 200\|416 + 24% from 2024 | No | No | Base | UK-EU ETS linkage after UK withdrawal agreement extension |
| Deeper cut in industry production numbers and much longer tail of emission reductions as a result of a more L-shaped crisis.<br>Power demand – slow recovery and generally lower post-crisis demand. In this scenario we use the same starting point as in the base scenario, but assume a slower recovery and do not expect power demand to reach pre-crisis levels again.<br>Industry production – deep cut in 2020, slow and incomplete recovery Very significant emission reduction due to Covid-19 impact on industry production, approximately doubling the emission reductions compared to the base case in 2020. The Economy is hit so hard that installations close and do not reopen until 2030, entering a period of generally lower industry production at around 90% of the pre-crisis levels, with the same annual growth rate adjustment as in the base scenario | | | | |

Source: ICIS

# 5 The impact of temporarily withholding allowances from the market

We have used our proprietary EU ETS Market model to quantify the impact of temporarily withholding physical EUAs from the market. Similar to the EU's back-loading initiative from 2014, we simulate how additional demand in the auctions in 2021 would result in more MSR allowance withdrawals/cancellations as well as less overall emissions by 2030 (our current model version stops in 2030).

We have run 4 scenarios and compare them against our base case scenario as defined above:

- Withholding 10 million EUAs during the auctions in 2021, and selling the full volume back to market in 2025, whereas demand and supply are equally distributed over time
- Withholding 10million EUAs in 2021, selling in 2030
- Withholding 100m EUAs in 2021, selling in 2025
- Withholding 100m EUAs in 2021 and 2022, and sales being equally distributed 2028-2030 (since the model stops end of 2030, selling all in 2030 would have distorted the results

We analyse the impact on 3 layers: Price, MSR withdrawals and overall emissions impact.

## 5.1 Price impact

In our model, a 10m position has a marginal price impact (scenarios 1 and 2). When acquired, prices are forecasted to increase by €2.48 per allowance (or 9.7%) and, throughout the holding period prices are on average €0.54-0.58 higher. For scenario 1, we observe a slightly lower price compared to the base case of €0.08 per allowance once the position is sold. This is due to additional emission reductions triggered during the holding period, which remain even after the 10m position is sold. For Scenario 2 we currently cannot assess post-holding impacts as our model stops in 2030.

Building a 100m position has a higher impact on prices, i.e. buying

- 100m EUAs in 2021 (Scenario 3) lifts prices by €14.74 in that year compared to our base case, and by €4.58 during the holding period to 2025. Again, prices are below the base case thereafter
- 100m EUAs spread out over 2021 and 2022 (Scenario 4) increases prices by €10.55 in 2021 and by €6.80 in 2022 compared to the base case scenario, and €3.18 across the holding period to 2025

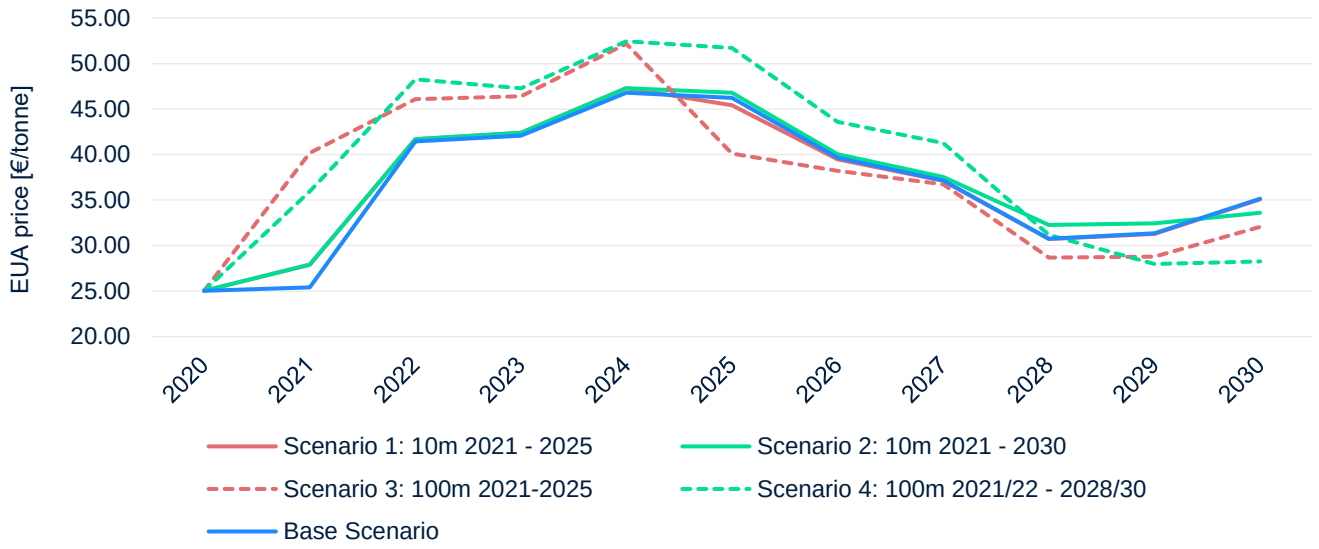
Chart 5 depicts the price curves, and Table 10 lists price deltas against the Base Case scenario.

**Table 10: Allowance price delta for each scenario against base case**

| | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Scenario 1 | €2.48 | €0.23 | €0.31 | €0.50 | -€0.83 | -€0.16 | -€0.03 | -€0.03 | -€0.08 | -€0.10 | €0.23 |
| Scenario 2 | €2.48 | €0.23 | €0.31 | €0.50 | €0.54 | €0.38 | €0.40 | €1.51 | €1.09 | -€1.57 | €0.59 |
| *Scenario 2 <> Green Deal Forecast* | *€2.48* | *€0.23* | *€0.31* | *€0.50* | *€0.54* | *€0.54* | *€0.54* | *€0.55* | *€0.70* | *-€4.28* | *€0.21* |
| Scenario 3 | €14.74 | €4.63 | €4.32 | €5.37 | -€6.14 | -€1.44 | -€0.43 | -€2.10 | -€2.58 | -€3.12 | €1.33 |
| Scenario 4 | €10.55 | €6.80 | €5.21 | €5.65 | €5.48 | €3.93 | €4.10 | €0.42 | -€3.37 | -€6.92 | €3.19 |

Source: ICIS

**Chart 5 Impact on prices against the base case scenario**




Source: ICIS

When we compare the impact of Scenario 2 against the Green Deal Forecast, we find that price deltas remain unchanged initially, but in the second half of the next decade, the impact becomes less strong, and prices drop more in absolute terms in 2030 when the position is sold again.

## 5.2 Emissions impact

To calculate the overall emissions impact, we need to separate the temporary (first order) effect and the lasting (second order) effect. Our model only calculates total values per year, so we need to make some assumptions to isolate the two effects to give an accurate view of the lasting impact. We will first look at the overall mechanics of the emission reductions, and then split out first order and second order effect.

### 5.2.1 The mechanics of emission reductions triggered by temporarily withholding EUAs

By temporarily withholding allowances from the market, additional emission reductions are triggered (as less permits to pollute are available). If more emission reductions are triggered, the TNAC (market balance as calculated for the MSR; see section 2.2) increases. In turn, the MSR will withdraw more allowances from the

market. These allowances are placed in a reserve, and as of 2023 allowances in the reserve that exceed last year's auction volumes will be cancelled.

In our modelling for this section, we assume that the MSR intake rate (this is the share of the surplus that is placed in the reserve per year), currently 24% is applied throughout the 4th trading period which runs until 2030. Note that current regulation reduces this intake rate to 12% as of 2024, but we assume that the reform of the MSR in 2021 will establish an extension of the 24% intake rate.

In our model, withholding 10 million allowances in 2021 triggers emission reductions of 7.73 million tonnes CO2e in the same year (and additional reductions in the following years – see Table 12). Therefore, the TNAC calculated in 2022 increases by 7.73m, and as of September 2022 24%*7.73m = 1.85m of this surplus are withdrawn from the auction volume over 12 month (0.62m in calendar year 2022, and 1.23m in 2023). In Table 11, this is shown in blue arrows. This effect entirely relates to the temporal withdrawal of allowances, or the first order effect.

In 2022, more emission reductions are triggered:

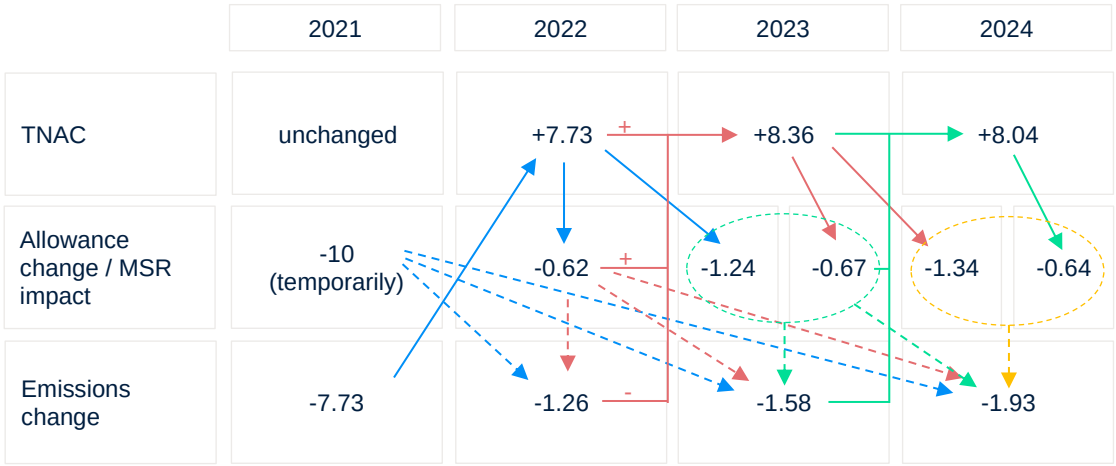
1. The 0.62m allowance withdrawals result in additional emission reductions which are permanent, as the 0.62m EUAs are not re-entering the market. This is a second order emissions impact
2. In addition, the 10m allowances withheld continue to trigger emission reductions also in following years

In total, our model calculated total emission reductions in 2022 of 1.26m. This additional reduction (and the withdrawal from auctions in 2022) brings the TNAC assessed in 2023 to +8.36m. Again 24% of this is withdrawn from auctions, 1/3 in 2023 and 2/3 in 2024. In Table 11, this is shown in orange arrows.

In 2024, the same thought process applies (arrows in green) and continues to run as long as the allowances are withheld. At the time they re-enter the market, the MSR effect drops as fresh allowance supply triggers additional emissions. Over time, the additional MSR intake moves to zero.

### Table 11: MSR impact breakdown for scenario 1&2 (all in million)

Dotted line: Allowance change impacts emissions | straight line: linear relationship




Source: ICIS

Once the allowances withheld are sold back to market, emitters can produce more CO2 again, which in turn lowers the market balance and triggers less MSR withdrawals going forward. Therefore, it is important to note that Scenario 2 & 4 show an incomplete picture, as our model stops in 2030, the same year in which allowances are sold back to market.

#### 5.2.2 Separating temporary and permanent effect

Since our model only calculates total emission reductions and MSR numbers, we use some basic assumptions to isolate first and second order effects. Again, we focus on scenario 1 and 2, but the same logic applies for scenario 3 and 4.

Reducing allowance supply does not necessarily reduce emissions in the same volume at the same time, as market reactions can be delayed and the nature of the ETS as being oversupplied allows for less reductions overall. Consequently, we need to derive a time series of an emission reduction factor that explains how an allowance supply reduction in year 1 results in emission reductions over time. We assume here that this time series does not change over time, i.e. a supply reduction in 2021 has the same impact over the next three years compared to a supply reduction in 2027.

Our model finds that withholding 10m allowances in year 1 trigger 7.73 emission reductions in the same year. This yields the reduction factor of 77.3% for year 1.

For the second year, we know that 0.62 allowances are withdrawn from the market through the MSR. Applying the factor of 77.3% we calculate that this should result in 0.48m tonnes emission reductions as second order reductions. Our model calculates total emission reductions of 1.26m in that year, so the remaining 0.78m can be attributed to the first order effect. This yields the reduction factor in year two of 0.78m/10m = 7.8%. We continue this process for all subsequent years as long as the allowances are held.

Once the allowances are sold, we use the same process to find the additional emissions triggered by adding more allowances to the market. The results are shown in Table 12

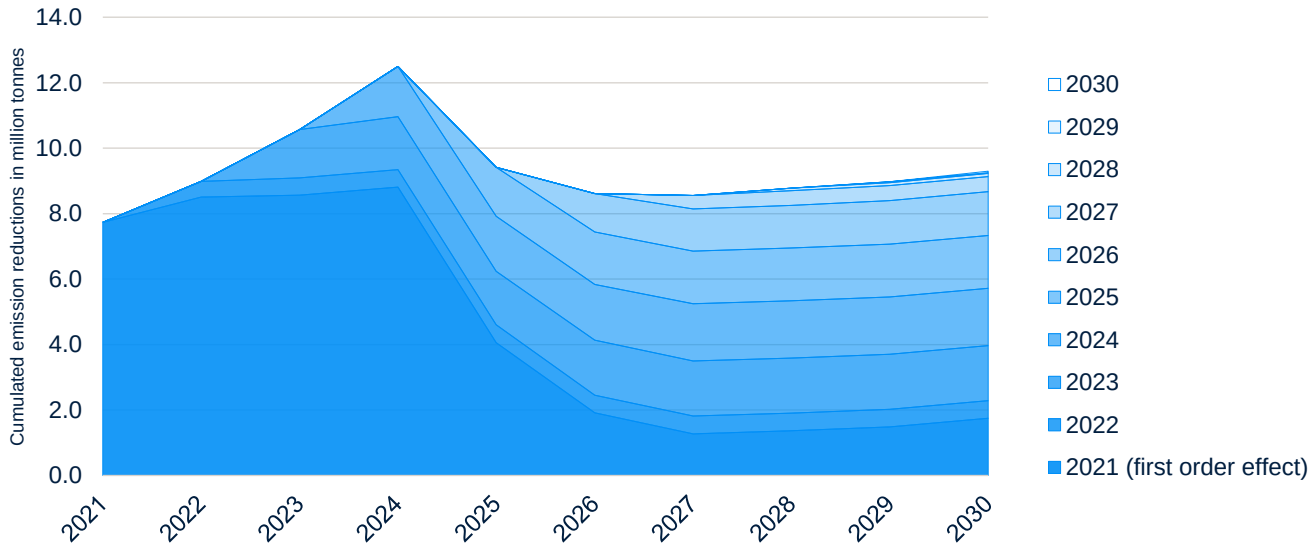
### Table 12: Derived emission change factor

| | Year 1 | Year 2 | Year3 | Year 4 | Sum |
|---|---|---|---|---|---|
| Supply reduction | -77.3% | -7.8% | -0.6% | -2.4% | 88.1% |
| Supply increase | 47.6% | 21.5% | 6.4% | -0.9% | 74.5% |

Source: ICIS

Now we can use this data to “layer” the secondary effect over time in chart 6:

### Chart 6: Cumulated emissions impact separated in first order and second order effect for Scenario 1




Source: ICIS

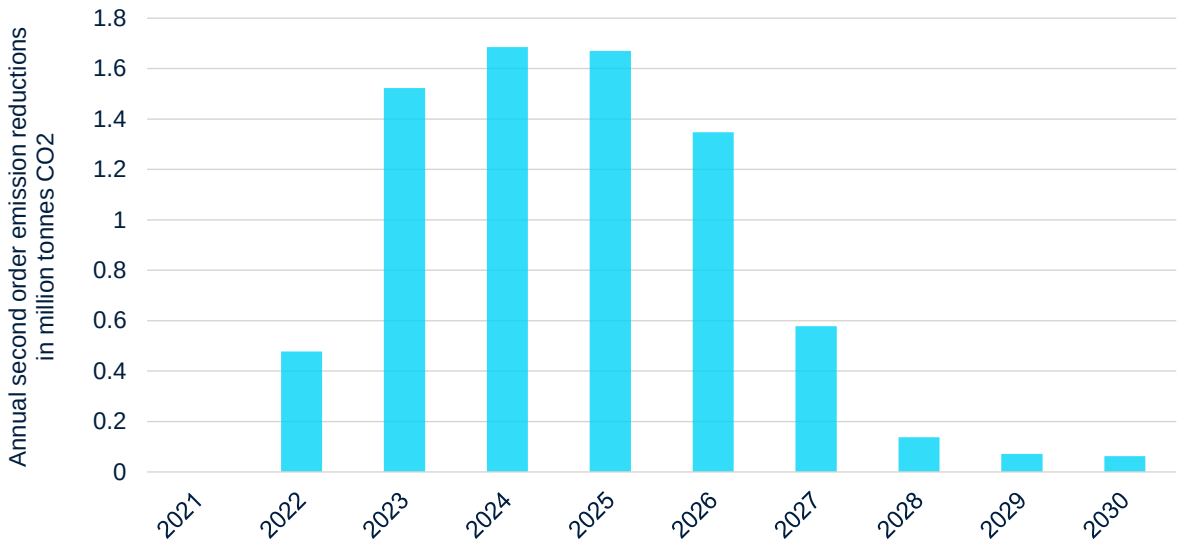
First order effect:

The development until 2027 is as expected: A strong increase in the first year with moderate additional reductions until the related allowance position is sold back into the market, causing the primary effect to shrink. It also makes sense that the first order effect does not drop to zero, as market participants are reacting in different ways on a supply decrease versus increase. However, the gradual increase as of 2028 is surprising. Still, withholding 10m allowances from the market for 4 years still results in a cumulated first order effect of 1.75m tonnes emission reductions

Second order effect:

Chart 7 shows the development of permanent emission reductions triggered. After a short increase after one year (due to the rather small MSR effect in the fifth year), the annual emission reductions average 1.62m tonnes, or 16.2% of the initial allowance volume withheld. In the 3 years after the allowances are sold back to market, the yearly additional second order effect reduces towards 0. In total, withholding 10m allowances for 4 years triggers a lasting second order effect of 7.49m tonnes cumulated emission reductions.

**Chart 7: Annual second order emission reductions in Scenario 1**




Source: ICIS

Overall, the resulting emission reductions from withholding 10m allowances from the market in 2021 and selling back in 2025 results in 9.30m tonnes emissions reduced by 2030.

Scenario 2:

We run the same calculations for scenario 2. However, our model currently ends in 2030, so that we have no good representation of emission developments post 2030. Generally, we find that by 2030 the first order effect of withholding 10m allowances from 2021 to 2030 sums up to 5.05m tonnes emission reductions, and the second order effect stands at 14.14m tonnes. Hence, during the holding period, 19.19m tonnes emissions are reduced.

If we now use the findings of Scenario 1 to simulate the drawdown once the allowances are sold back to the market, we find that the first order effect drops to 2.74m tonnes while the secondary impact increases to 16.34m tonnes, resulting in an overall emissions impact of 19.08m tonnes by 2035.

### 5.2.3 Results summary

Overall, in all scenarios the MSR withdrawal mechanism drives significant emission reductions that are lasting. Table 13 details the annual MSR withdrawal in each scenario, and Table 14 lists the total emission reductions triggered. Please keep in mind that the results for Scenario 2 and 4 need to be interpreted with caution, as our model does not extend beyond 2030 and therefore does not show long-term impacts. However, as shown in 5.2.2, the actual change in cumulative emission reductions 5 years after the allowances are sold back to the market is marginal.

**Table 13: Total impact on MSR withdrawals over time in million allowances**

| | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Scenario 1 | 0 | 0.62 | 1.9 | 1.98 | 1.93 | 1.52 | 0.53 | 0.11 | 0.03 | 0.06 | **8.68** |
| Scenario 2 | 0 | 0.62 | 1.9 | 1.98 | 1.93 | 1.92 | 1.95 | 2 | 1.9 | 1.74 | **15.94** |
| Scenario 3 | 0 | 4.17 | 13.98 | 17.34 | 18.44 | 14.96 | 5.18 | 1.41 | 1.14 | 2.03 | **78.65** |
| Scenario 4 | 0 | 2.72 | 10.26 | 15.36 | 17.71 | 18.95 | 19.58 | 20.15 | 19.01 | 13.93 | **137.67** |

Source: ICIS

**Table 14: Change in annual emissions against base case scenario [million tonnes]**

| | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Scenario 1 | -7.73 | -1.26 | -1.58 | -1.93 | 3.09 | 0.80 | 0.06 | -0.23 | -0.19 | -0.33 | **-9.30** |
| Scenario 2 | -7.73 | -1.26 | -1.58 | -1.93 | -1.99 | -2.14 | -2.17 | -0.29 | -3.29 | 3.19 | **-19.19** |
| Scenario 3 | -52.15 | -22.60 | -19.08 | -20.81 | 31.93 | 6.60 | -1.28 | -5.79 | -3.53 | -6.14 | **-92.84** |
| Scenario 4 | -52.15 | -22.60 | -19.08 | -20.81 | -20.49 | -21.93 | -23.44 | -18.89 | -29.11 | 29.52 | **-198.97** |

Source ICIS

## 5.4 Summary of impact

Temporarily withholding allowances from the market creates a lasting impact on emissions in the EU ETS, as the triggered emission reductions translate through the MSR into permanent cancellation of allowances. The effect differs both by volume of the allowances withheld as well as the duration of withholding allowances.

Our analysis is based on a model that does not extend beyond 2030, so our quantification of effect falls short of longer-term effects. That being said, Table 15 summarises the findings for each scenario:

**Table 15: Impact 2021 - 2030 of temporarily withholding allowances for different volumes and holding periods**

| Volume [million allowances] | Duration [years] | Average price delta [€/tonne] | Allowances withdrawn [million allowances] | Emissions reduced [million tonnes CO2e] |
|---|---|---|---|---|
| 10 | 4 | €0.23 | 8.68 | 9.30 |
| 10 | 9 | €0.59 | 15.94 | 19.19 |
| 100 | 4 | €1.33 | 78.65 | 92.84 |
| 100 | 8 | €3.19 | 137.67 | 198.97 |

Source: ICIS

# ICIS EU ETS Report

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