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Investing in EU carbon markets: where now?

01 Market development

02 EU Emissions Trading Scheme (ETS)

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Key takeaways

- Ongoing developments in Europe, coupled with the expansion of carbon pricing initiatives worldwide, suggest that carbon could become a major commodity market.
- The low correlation of carbon prices in the EU ETS with all major asset classes highlights the potential benefits of adding carbon to an investment portfolio. Seen over a 5-year horizon, returns have outperformed major asset classes.
- There are fundamental reasons to expect EU ETS prices to rise over the longer-term, but a range of challenges still have to be addressed with global coordination also important.

01 Market development

Putting a **market price** on carbon emissions shifts the financial burden for the damage emissions cause back to those who are responsible for them and can take action to reduce them. Instead of governments dictating who should reduce emissions (and where and how), a carbon price gives an economic signal, and emitters decide for themselves whether to discontinue or reduce emissions, or continue with them and pay for it. In theory, the overall environmental goal is then achieved in the most flexible and least-costly way to society. If it is at an appropriate level, a carbon price can also stimulate clean technology and market innovation, spurring on new, low-carbon drivers of economic growth.

In this report, we look at **compliance markets**. Governed by mandatory regulations, these markets allow entities to meet legally binding emissions reduction targets. The majority function within Emission Trading Schemes (ETS), where governmental organizations allocate carbon emission allowances to firms and industries. These permits stipulate the maximum amount of carbon that permit holders may emit, setting a cumulative threshold for emission output. Allowances can subsequently be traded in the secondary market.

We do not look at **voluntary markets** – separate, much smaller but growing markets which allow sectors not regulated by compliance schemes to voluntarily offset their greenhouse gas emissions by purchasing carbon credits from projects aimed at removing or reducing GHGs from the atmosphere.

Since the mid-2000s, compliance carbon markets have expanded globally. The European Union ETS is the largest but according to the International Carbon Action Partnership, there are currently 29 active compliance systems with an additional 20 under development, particularly in Latin America, Asia-Pacific, and Africa. The functioning of these markets is guided by principles of transparency, integrity, stability, and accountability, as outlined by the International Organization of Securities Commissions (IOSCO).

As shown in Figure 1, in 2021, the global market value for carbon dioxide traded in these markets approached one trillion USD in 2023. Around 90% of this value is accounted for by the European Union Emission Trading System (EU ETS), which now covers approximately 8% of global CO_2 emissions. Due to its importance, this report will focus on the EU ETS market, explained in the sections below.

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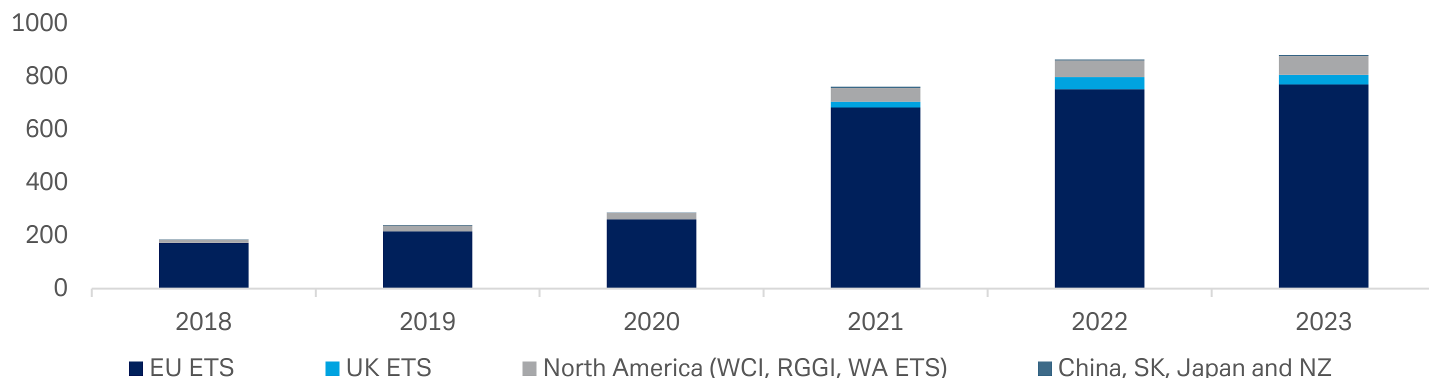
Figure 1: Total value of carbon markets by segment (EUR bn)



Source: LSEG Datastream, Deutsche Bank AG. Data as of February 2024.

The UK ETS and China ETS markets are also noteworthy. The **UK** launched its own Emissions Trading Scheme (ETS) in January 2021, modelled closely on the EU ETS but with some key differences. It has a tighter cap on emissions, starting at 5% lower than the UK's previous (pre-Brexit) notional share of the EU ETS cap. Regular auctions of allowances are held, and the UK government has reserved the right to intervene to ensure market stability and address price spikes. The UK ETS is aligned with the country's broader Net Zero Strategy, aiming to achieve net-zero emissions by 2050.

China's national ETS became operational in July 2021 and is expected to eventually become the world's largest carbon market. What makes China's scheme different from those operating in many other countries and regions, such as the EU, Canada and Argentina, is that China has chosen to focus on reducing the intensity of emissions generation, rather than absolute emissions. Power companies in China are thus incentivized to produce the same or greater amount of energy while reducing their emissions or keeping them at the same level. The implication is that absolute emissions can still increase as energy output increases, so long as the companies are reducing the volume of emissions per unit of energy output.

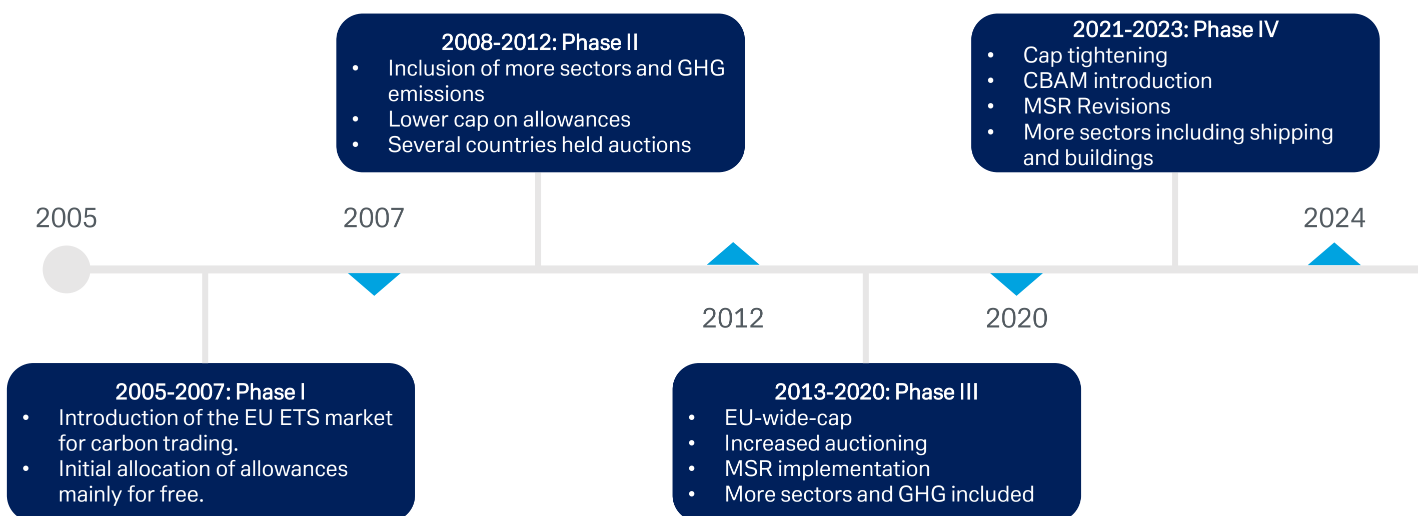
China's compliance market is still nascent, covering only the power sector, but aims to include the iron and steel, cement, aluminium, non-ferrous metals, chemicals, paper, oil refining, and aviation industries by 2025. The recent CO_2 price rally in China was mainly driven by expectations of reductions in carbon permits, which would raise the demand for renewable energy and cut down coal-fired power plants.

02 EU Emissions Trading Scheme (ETS)

Brief history

The Kyoto Protocol to the UN Framework Convention for Climate Change (UNFCCC) was agreed on in 1997 and set legally-binding GHG reduction targets, or caps, for 37 industrialised countries for the first commitment period (2008–2012). This led to the need for policy instruments to meet these targets and consequently the introduction of the EU ETS in 2005.

Figure 2: Development of the EU ETS market since inception



Source: Deutsche Bank AG. Data as of July 2024.

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As shown in Figure 2, the first pilot phase (**Phase I**) of the EU ETS ran from 2005 to 2007. It was used to test price formation in the carbon market and to establish the necessary infrastructure for monitoring, reporting and verification of emissions. The cap used was largely based on estimates as there was no reliable emission data available.The primary purpose of phase I was to ensure that the EU ETS was functioning effectively before 2008, so EU Member States could meet their commitments under the Kyoto Protocol. One key feature of phase I was that allowances were given to businesses for free.

Phase II of the EU ETS ran from 2008 to 2012, the same period as the first commitment period under the Kyoto Protocol. The cap on emissions was lowered by 6.5% compared to 2005, the proportion of free allowance allocation fell to around 90%, with several countries holding auctions, and the aviation sector was brought into the EU ETS. Because verified annual emissions data from the pilot phase was now available, the Phase II reduction in the cap on allowances was based on actual emissions. However, the 2008 economic crisis led to actual emissions reductions that were greater than expected. This led to a large surplus of allowances and credits, which weighed heavily on the carbon price throughout Phase II.

The reform of the ETS framework for **Phase III** (2013-2020) then changed the system considerably. The main changes included:

- a single, EU-wide cap on emissions in place of the previous system of national caps;
- auctioning as the default method for allocating allowances (instead of free allocation);
- harmonised allocation rules applying to the allowances still given away for free;
- more sectors and gases included;
- creation of the Market Stability Reserve (MSR).

In July 2021, the European Commission proposed the **Fit for 55** package to align EU climate and energy policies with the new 2030 target of reducing net greenhouse gas emissions by at least 55% compared to 1990 levels. This includes revising the EU ETS to lower the cap on emissions and expanding the system to cover new sectors such as maritime transport, buildings, and road transport (**Phase IV**). Starting this year (2024), carbon emissions from maritime transport have been included in the ETS: 100% of emissions are covered for voyages between EU ports and 50% of emissions for voyages starting or ending outside of the EU.

In addition, the Commission has proposed the Carbon Border Adjustment Mechanism (CBAM), aiming to prevent carbon leakage by placing a carbon price on imports of certain goods from outside the EU, ensuring that European companies are not disadvantaged by stricter EU emissions regulations compared to those applied to competitors in other regions. On October 1, 2023, the CBAM came into force in its transitional phase, with the first reporting period for importers ending January 31, 2024. CBAM will apply in its definitive form from 2026, after the current transitional phase between 2023 and 2025. From 2026, a growing proportion of imported emissions from included industries will have to buy CBAM certificates linked to the ETS price. Companies affected may therefore aim to hedge their future exposure, increasing EU allowances (EUA) demand.

The EU is also legitimizing carbon removal technologies by establishing a certification framework. This will ensure the quality of carbon removal credits, preventing a repeat of the situation with voluntary carbon offsets, which have been often criticized for not representing real emissions reductions. These certified carbon removal credits could potentially at some point be included in the EU ETS, further boosting the market.

How does the EU ETS market work?

The EU ETS works on the **cap-and-trade** principle. A cap is a limit set on the total amount of greenhouse gases that can be emitted by the installations and aircraft operators covered by the system. The **cap is reduced annually** in line with the EU's climate target, ensuring that emissions decrease over time. Since 2005, the EU ETS has helped bring down emissions from power and industry plants by 35%. As a first milestone, the EU is aiming to reduce net emissions by at least 55% by 2030 compared to 1990.

The cap is expressed in terms of emission allowances, where one allowance gives the right to emit one tonne of CO_2eq (carbon dioxide equivalent). Every year, companies must surrender enough allowances to fully account for their emissions, otherwise heavy fines are imposed. Within the cap, companies primarily buy allowances on the EU carbon market, but they also receive some allowances for free.

Companies can also **trade** allowances with each other as needed. If an installation or operator reduces their emissions, they can either keep the spare allowances to use in the future or sell them. From 2020, around 57% of EU allowances (EUAs) have been sold in periodic auctions primarily through the European Energy Exchange (EEX).

The declining cap offers companies some degree of certainty about the scarcity of allowances in the long term and ensures that allowances have market value. Allowance prices serve as an incentive for companies to reduce emissions how and where it costs them least to do so. Prices also determine the **revenues** that the EU ETS generates from the sale of allowances. Since 2013, the EU ETS has generated over EUR152bn in revenues[1]. Based on estimates from the Commission, around 78% of revenues in 2013-2019 were used for climate and energy related purposes.

The EU ETS now covers emissions from the following specific activities, focusing on emissions that can be measured, reported and verified with a high level of accuracy:

- electricity and heat generation
- energy-intensive industry sectors, including oil refineries, steel works, and production of iron, aluminium etc.
- aviation within the European Economic Area and departing flights to Switzerland and the United Kingdom
- maritime transport, specifically 50% of emissions from voyages starting or ending outside of the EU and 100% of emissions from voyages between two EU ports and when ships are within EU ports

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Participation in the EU ETS is mandatory for companies in these sectors. But in some other sectors, only operators above a certain size are included and certain small installations may be excluded if governments put in place alternative measures to cut their emissions. From 2024, installations for the incineration of municipal waste above a certain threshold are also required to monitor and report their emissions in the EU ETS.

As a result, the EU ETS regulates emissions from 8,757 electricity and heat plants and manufacturing installations in the EU 27 Member States (plus Iceland, Liechtenstein, Norway, and Northern Ireland), as well as 371 aircraft operators flying between European Economic Area (EEA) airports, and from the EEA to Switzerland and the UK. The ETS is also linked with the UK and Swiss ETS. ETS coverage represents around 36% of all EU emissions.[2]

The supply of emission allowances is provided and mostly pre-determined by European lawmakers to ensure emissions targets are met, with some adjustments applied dynamically to stabilize the market's supply-demand balance (like the MSR, see below). Allowances are either given out for free or auctioned. **Free allocation** was introduced as a protective measure to ensure companies operating in the EU remained competitive with overseas counterparts that were not exposed to carbon costs. To date, a large portion of industrial emissions have been covered by free allocation, while utilities have largely had their free allocation phased-out already. The maximum amount of free allocation cannot exceed 43% of the total allowance cap each year.

An essential component of the market is the **Market Stability Reserve** (MSR), created to address a problem that arose during Phase II (2008-12). The problem was that the emissions cap had been set with an assumption of 2.5% GDP growth. But after the start of the financial crisis, and resulting fall in economic growth, there was a surplus of 2.1bn allowances which led to a significant ETS price decline. To address this problem, the EU Commission delayed the auctioning of 900m allowances from 2014-16 to 2019-2020.

The MSR started operating in 2019, being intended to address the surplus of allowances then evident in the EU's carbon market. The MSR is a ruled-based mechanism, designed to stop any interference by the Commission in how it operates. Rather, it automatically places allowances in the reserve (or releases them) only when pre-defined thresholds are crossed. This has helped balance supply and demand for EUAs, including through the Covid-19 pandemic in 2020-2022 when economic activity and emissions fell sharply, with the MSR also contributing to the recent increase in price and reduction in volatility.

Lastly, **EUA futures** are by now a well-established asset class, having been traded for over 15 years. As of July 2023, the open interest (i.e. value of contracts not yet settled) across EUA futures listed on the Intercontinental Exchange (ICE) was around EUR50bn. This is comparable to the open interest in BTP futures (around EUR43bn) and is over 1/3 of the open interest in bund futures (EUR136bn). Liquidity on EUA futures on the Intercontinental Exchange is consistently in the EUR1-2bn range in each daily trading session.[3]

03 EUA performance and outlook

Carbon prices in the EU ETS have fallen from a record EUR100/t in February 2023 to EUR50/t in March 2024, before climbing back again to EUR75/t recently as shown in Figure 3 below. This has been due to a mix of structural factors (e.g. a secular fall in EU CO_2 emissions due to decarbonization) and cyclical trends (e.g. temporarily subdued manufacturing activity).

The first reason for price falls in early 2024 can be seen as a "good" one: according to estimates, the EU is emitting significantly less CO_2 than in the past (1.2bn tonnes in 2023 compared to 1.4bn in 2022). This positive trend is however partly cyclical. Almost half of ETS emissions come from the European industrial sector, which has recently been hobbled by high energy prices, recession concerns and cost inflation – taking a toll on the sector's activity levels and emissions, and thus demand for carbon allowances.

Most of the other ETS emissions come from the power sector, which is on a clearer **decarbonization trajectory**, with an increasing share of generation coming from renewables. A decline in demand has also been driven by recent falls in gas prices, which have triggered coal-to-gas switching by consumers, which in turn has decreased demand for carbon allowances given the lower emissions intensity of gas-fired power plants vs. coal-fired power plants.

Figure 3: EUA price development since 2005 (EUR/tCO_2)

Source: Bloomberg Finance L.P., Deutsche Bank AG. Data as of July 2024.

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There is however a cyclical element here too. Lower demand for electricity – down almost 7% between 2021 and 2023[4] – is a consequence of price spikes in 2022 and can be expected to reverse.

Another contributory factor to the fall in carbon prices has been the EU auctioning additional allowances to finance energy transition investments, as part of the REPowerEU policy (around 87m allowances in 2024 assuming an average auction carbon price of EUR75/t as per BloombergNEF). Importantly, it is doing so by bringing forward the distribution of permits that would otherwise have been issued in the three years from 2027, essentially borrowing from future supply of permits. So, while the current confluence of factors – lower emissions, cheap gas, high interest rates, and muted industrial activity – is keeping EU carbon prices subdued, this might be a temporary lull. As noted above, many drivers are likely to reverse in the next few years, suggesting a looming supply squeeze on permits and a subsequent price surge.

Firstly, the specific factors causing the current low-price environment are unlikely to persist. **Low gas prices** are currently (as noted above) pushing coal out of the power generation equation, decreasing demand for high-emitting options. This trend reduces emissions from the power sector overall and therefore weakens demand-side fundamentals for EUAs. Yet, it may not persist indefinitely.

Muted industrial activity due to high energy prices and economic uncertainty is also contributing to the current emissions reduction, with emissions in 2024 expected to be broadly flat vs. 2023. As the EU economy continues to recover, industrial activity and emissions are expected to rebound. Extreme summer heat has also led to increased demand for cooling, supporting carbon prices. Overall, climate risks would seem typically to skew carbon prices to the upside.

Secondly, the current low prices for CO_2 could have a perverse effect, discouraging investment in **new emission reduction technologies**. Technologies like carbon capture, which require a CO_2 price above EUR100 per tonne to be economically viable, will become even less attractive in the short term. This could limit our ability to reduce emissions in the future, leading to a sharper rise in permit prices as demand increasingly outpaces supply.

Thirdly, the **supply side of the equation** is poised for a significant shift. The EU's commitment to a drastic reduction in ETS permits by 2030 is, as noted above, on track to create a supply squeeze within a few years. This could lead to a scarcity of hundreds of millions of CO_2 permits compared to today's levels by 2027. Ambitious targets to reduce emissions across a growing number of sectors alongside a tightening supply of European carbon allowances over time underpin a bullish supply side backdrop for carbon prices. The declining cap means that EUAs could disappear by 2039 with long-term price implications that will depend on the speed and cost of industrial decarbonization and policy response.

EU policy reforms could lead to even **faster cap reductions**. 2026 could mark the tipping point as a variety of largely bullish policy amendments and legislative reviews start to yield results. The maritime sector will be fully phased into the EU ETS, aviation's supply of free allowances will cease, the reduction of free allocation due to the CBAM will start, and seven substantial carbon market policy reviews will be finalized.

Coupled with recovering industrial output, many analysts are expecting carbon prices to move markedly above EUR100/tonne in coming years (Bloomberg is at the high end of the range of expectations, forecasting an even higher price of EUR150 per tonne in 2030). The introduction of new investment products may increase the appeal of carbon prices as a distinct asset class and encourage increasing speculative activity and price volatility.

We still, however, see many **risks** which should be monitored closely. In particular, the exact volume of allowances needed to reach the EUR20bn REPowerEU funding target remains to be seen. Price movements of other energy commodities will also often impact the EU carbon price (as noted above), making the market certain to remain sensitive to geopolitical events.

Figure 4: Comparison of risk return trade-offs across major asset classes

	Carbon	Global Equities	Global Fixed Income	Gold	Broad Commodities
1 year					
Ann. Return	-24.14%	22.46%	0.93%	24.19%	1.40%
Ann. Volatility	35.68%	9.40%	6.30%	12.48%	11.64%
Correlation	-	-0.04	0	0.07	0.06
3 years					
Ann. Return	5.55%	10.52%	-5.50%	13.51%	5.72%
Ann. Volatility	45.56%	13.98%	6.76%	13.62%	17.43%
Correlation	-	0.08	-0.01	-0.04	-0.01
5 years					
Ann. Return	20.30%	13.08%	-2.02%	11.88%	6.09%
Ann. Volatility	45.74%	18.03%	6.04%	14.84%	16.63%
Correlation	-	0.24	0	0.02	0.13

Source: Bloomberg Finance L.P., Deutsche Bank AG. Data as of July 2024. Carbon represents EUA Futures; Global Equities represents the MSCI World Net Total Return Index; Global Fixed Income represents the Bloomberg Global-Aggregate Total Return Index Value Unhedged; Broad Commodities represents the Bloomberg Commodity Index; Gold represents the LBMA Gold Price PM.

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04 Carbon in the portfolio context

Developments in the European carbon trading system, coupled with the expansion of carbon pricing initiatives worldwide, suggest a future where carbon becomes a major commodity market.

Over time, as policymakers have learned from the past and supported reforms to the ETS rules over time, volatility has reduced but remains higher than other asset classes. It was always the intention that Europe's carbon market should evolve and improve based on experience. Phase I (2005-07) was a 'learning by doing' pilot with almost all allowances given to companies for free. One initial problem was that, as reliable emissions data did not yet exist, the number of allowances exceeded emissions and the price fell to zero. But policymakers and the market learned from experience and supported reforms to the ETS rules over time. Seen over a 5-year horizon, returns have outperformed major asset classes – see Figure 4 – but the ride has often been a bumpy one.

The low **correlation** of EUA prices with all major asset classes suggests another potential benefit of adding carbon to a diversified portfolio. Figure 4 below displays the correlation with leading European equity and bond indices. The slightly higher correlation with equities can probably be explained by a strong economy producing more emissions, driving up prices for a decreasing supply of allowances as well as (often) equities prices overall.

Looking at portfolio management from a different perspective, equity portfolios will have differing **exposure to carbon price risk** depending on their allocation to companies participating in the EU ETS. As the number of EUAs falls each year (the emissions cap) falls and as the proportion of allowances being auctioned increases, the ETS carbon price seems likely to increasingly affect energy-intensive sectors. As EUA prices rise, an investment in carbon allowances may therefore help counteract potential financial risks in the equity portion that arise from invested companies' obligation to participate in the EU ETS.

There are currently two main ways to **add exposure** to the EU ETS markets to portfolios:

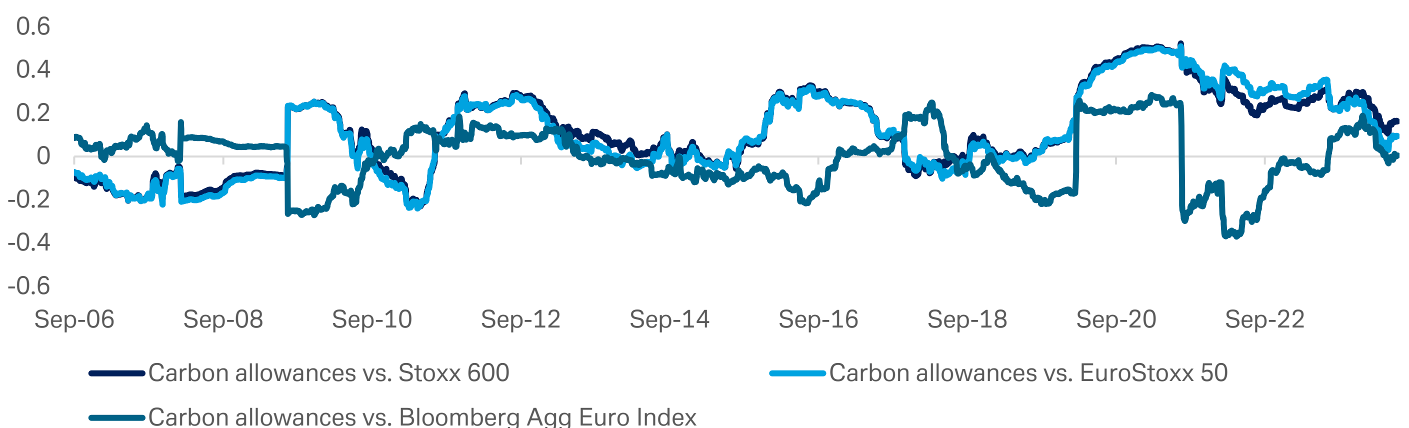
- Physical Carbon Allowances via Exchange Traded Commodities (ETC). A Special Purpose Vehicle (SPV) holds carbon allowances which would be owned by an ETC, giving a 1:1 exposure to the underlying allowances. A long position in these may allow for the greatest diversification benefits, avoids investment fees from rolling futures contracts and the associated contango costs.
- Structured products based on derivative contracts. Futures are rights to purchase allowances at a predetermined date and price. As mentioned before, there is now an active EUA futures market allowing investors to roll positions regularly, thus allowing them to gain exposure to EUA prices without settling the contracts into allowances. Structured products based on EUA futures have the potential to offer attractive regular coupons, together with 1:1 exposure to EUA prices. On the other hand, though, this solution incurs contango costs of around 1-2% per year due to the need to continuously roll the position forward.

DWS calculations suggest that adding a small carbon EUA allocation could improve portfolios' return and reduce volatility. Using a strategic asset allocation (SAA) model, they estimate Defensive, Balanced, & Dynamic portfolios could receive a small return enhancement (0.11% to 0.23% to 0.34%) with reduced volatility, by adding carbon with an allocation ranging from 2.1% to 4.5% to 6.75%, respectively.

05 Challenges and shortcomings

Carbon markets still face several challenges that need to be addressed. First of all, ensuring the integrity and transparency of carbon credits is crucial to maintaining the credibility and effectiveness of these markets. The EU has implemented several measures to uphold high standards in markets, such as rigorous monitoring, reporting, and verification (MRV) processes, and robust market oversight through regulations like the Market Abuse Regulation (MAR) and the Markets in Financial Instruments Directive (MiFID II). Yet, issues like double counting, overestimation of emission reductions, fraud (cyber or conventional) and perceived greenwashing could still undermine market credibility.

Figure 5: Correlation of EU allowances carbon prices with other asset classes



Source: Bloomberg L.P., Deutsche Bank AG. Data as of July 2024.

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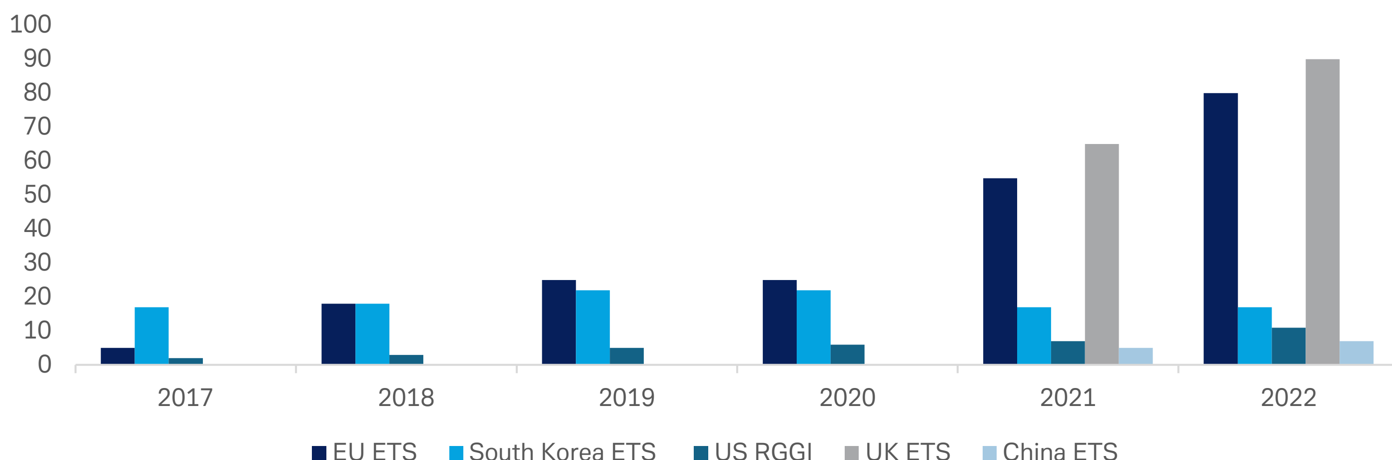
Figure 6: Average price of carbon allowances (in EUR/tonne)



Source: Refinitiv, Bloomberg L.P., Deutsche Bank AG. Data as of April 2023. EU ETS represents EUA Futures; South Korea ETS represents KR Allowance Unit; US RGGI represents the Regional Greenhouse Gas Initiative (Spot); UK ETS represents UK Emissions Allowances Futures; China ETS represents China National Carbon Emissions Allowance.

Global coordination among different ETS is also important. Harmonizing standards and linking ETS can prevent issues like carbon leakage, where companies relocate their production and emissions to regions with less stringent regulations. Given the rising price of carbon in Europe, competitiveness issues are also important. European companies may face competitive disadvantages compared to international counterparts due to stricter emissions regulations and associated costs.

To mitigate this, the EU ETS includes mechanisms like free allocation of allowances to vulnerable industries and the potential inclusion of imported carbon credits to level the playing field.

The CBAM was introduced to address these risks and its effectiveness will be crucial for the long-term viability of the EU ETS market. In countries without a national carbon credit scheme, the CBAM may incentivise its creation, especially if the EU is a key destination for their carbon-intensive goods. The UK, with its ETS largely designed to follow the EU scheme, may see its carbon market further aligned with it. But even with the CBAM, ongoing coordination with global trading partners and efforts to establish similar carbon pricing mechanisms worldwide will be necessary to prevent competitive imbalances. At present, carbon prices vary substantially between markets (Figure 6).

Unintended consequences of schemes and second-round effects, such as risks to economic activity due to higher prices and relocation of production, must always be an important factor, since consumers will likely ultimately bear the costs and smaller companies will be asymmetrically affected.

Carbon **price volatility** could also remain an issue, reducing the ability of schemes to drive substantial investments in low-carbon technologies. Although the introduction of the Market Stability Reserve (MSR) in 2019 helped to some extent, significant fluctuations and generally low prices have persisted, limiting the ETS's effectiveness in driving down emissions.

Overall, continuous **innovation and scaling** are needed to increase the impact of carbon credits. Inclusion of more sectors and related emissions into the scheme, improved verification methods, global coordination with key trading partners to level the playing field and avoid carbon leakage, and enhanced market infrastructure will be part of this. As the market evolves, innovations will ensure that carbon credits continue to drive meaningful environmental and economic benefits.

06 Conclusion

The EU's commitment to a sharp reduction in ETS permits by 2030 is likely to cause a squeeze on supply for allowances. From an investor perspective, given this mandated drop in the availability of permits, even stable demand would (everything else being equal) be expected to drive prices upwards in coming years. The EU’s Carbon Border Adjustment Mechanism (CBAM), putting a levy on imports from countries without equivalent carbon pricing schemes, may also help underpin prices.

These developments in Europe, coupled with the expansion of carbon pricing initiatives worldwide, suggest **a future where carbon becomes a major commodity market**. While some volatility is likely, investors may want to position themselves for the long-term growth of this market. In addition, because of the low correlation between carbon prices and other asset classes, addition of carbon allowances to the portfolio may contribute to investment outcomes by improving diversification.

Investing in carbon allowances should however be seen as **complementary to a broader net zero transition and risk hedging investment strategy**, taken alongside other transition-focused investment in public and private markets.

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Historical performance

Performance	22.07.2023 - 22.07.2024	22.07.2022 - 22.07.2023	22.07.2021 - 22.07.2022	22.07.2020 - 22.07.2021	22.07.2019 - 22.07.2020
EUA Futures*	-28.79	18.94	49.84	91.34	-8.25
STOXX Europe 600 Price EUR	14.35	13.15	-3.56	27.06	-0.90
EURO STOXX 50 Price EUR	15.42	26.44	-8.32	24.90	-0.70
Bloomberg Aggregate Euro Index*	4.22	-5.68	-11.75	0.95	1.88
MSCI World Net Total Return Index	21.98	6.89	1.54	31.73	4.45
Bloomberg Global Aggregate Total Return Index Value*	1.41	-1.22	-15.19	1.33	6.46
Bloomberg Commodity Index*	-7.25	-16.17	40.26	38.97	-17.09
LBMA Gold Price PM*	24.27	3.82	10.97	-4.43	25.72
KR Allowance Unit*	-25.84	-41.56	-9.07	-14.69	-
Regional Greenhouse Gas Initiative (Spot)*	82.30	-3.38	72.25	38.51	9.12
UK Emissions Allowances Futures*	-20.42	-42.55	8.65	-	-
China National Carbon Emissions Allowance*	40.00	-3.86	13.12	11.57	-

*Total return in EUR. *Percentage change in price overstated time horizon (EUR). Source: Bloomberg Finance L.P., Deutsche Bank AG. Data as of July 23, 2024.

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Glossary

Carbon permits allow the permit holder to emit a limited amount of CO_2 or other greenhouse gases.

Correlation is a statistic that measures the degree to which two variables move in relation to each other.

The European Energy Exchange (EEX) is a central European electric power and related commodities exchange located in Leipzig, Germany.

The European Union Emission Trading Scheme (EU ETS) is a carbon emission trading scheme that began in 2005 and is intended to lower greenhouse gas emissions in the EU.

Exchange Traded Commodities (ETC) are securities that gives investors who do not have direct access to spot or derivatives commodities markets the opportunity to invest in commodities.

Free allocation is a measure under the ETS whereby sectors are supported for having to pay to pollute.

Futures are contracts that obligate two parties to trade an underlying asset at a pre-determined price at a future date.

The International Carbon Action Partnership is an international cooperative forum founded in 2007 which brings together states and sub-national jurisdictions that have implemented or are planning to implement emission trading systems.

The International Organization of Securities Commissions (IOSCO) is the international body that brings together the world's securities regulators and is recognized as the global standard setter for financial markets regulation.

The Market Abuse Regulation (MAR) aims to ensure that EU legislation keeps pace with market developments to combat market abuse on financial markets, including derivative markets relating to commodities.

A market price is the price of a commodity when sold in a given market.

Markets in Financial Instruments Directive (MiFID II) is a revision of the original MiFID published in 2004 and is a European Union legislation designed to regulate financial markets. It aims to make the financial sector more accessible, transparent and effective for market participants.

The Market Stability Reserve (MSR) is a mechanism designed to provide stability for the EU ETS. It addresses the current surplus of allowances and improves the system's resilience to major shocks by adjusting the supply of allowances to be auctioned.

The term "Net Zero" refers to a situation in which the economy, society, or a particular economic sector emits no carbon dioxide (CO_2), either because it does not produce any or because it collects the CO_2 it does produce for use or storage.

The REPowerEU policy is a European Commission proposal to end reliance on Russian fossil fuels before 2030 in response to the 2022 Russian invasion of Ukraine.

Markets in Financial Instruments Directive (MiFID II) is a revision of the original MiFID published in 2004 and is a European Union legislation designed to regulate financial markets. It aims to make the financial sector more accessible, transparent and effective for market participants.

The secondary market is where investors buy and sell securities among themselves, rather than from issuers.

The UN Framework Convention for Climate Change (UNFCCC) is the UN process for negotiating an agreement to limit dangerous climate change.

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