



PORTFOLIO

COMPASS

Global Carbon Markets Outlook

June 2023

Key Highlights

- ▶ We believe there is still asymmetric upside for the price of carbon, which remains at levels too low for global carbon targets.
 - ▶ Since 2015, the total trade value of the world's four largest carbon markets has grown tremendously at 47% p.a.
 - ▶ We are bullish on the long-term outlook for carbon permit prices in compliance markets as they remain the policy tool of choice for incentivising abatement.
 - ▶ The EU emissions cap is being reduced at an increasing rate, going from 2.2% to 4.3% from 2024-2027 and to 4.4% from 2028-2030.
 - ▶ Demand for carbon credits is set to increase further in the EU with two one-off 'rebasings' of the cap, reducing it by 90 million allowances in 2024 and an additional 27 million in 2026.
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Introduction

Reaching the net-zero target is more critical than ever. To achieve the Paris temperature goals, carbon pricing is being widely adopted by countries and regions around the world. Since the 2000s there have been several innovative mechanisms such as carbon allowance emission trading schemes (ETSs), carbon taxes and carbon offsets to curb greenhouse gas (GHG) emissions. Revenues from carbon taxes and ETSs grew by over 10% in 2022, reaching almost US\$95 billion globally¹. The proceeds in turn will be utilised by governments to fund decarbonisation projects and to address climate change.

This report focuses on compliance carbon markets which are mandatory and regulated by governments in their respective jurisdictions. The leaders in the market include the European Union Emissions Trading System (EU ETS), the UK Emissions Trading Scheme (UK ETS), the Western Climate Initiative (California Cap and Trade Program) and the Regional Greenhouse Gas Initiative (RGGI) for the member states in the east coast of the United States. Together these markets represent some of the largest regional economies in the world, and the secondary futures market for those programs predominantly trade on ICE's futures markets.

Starting from a compliance carbon market overview, this report delves into the market performance and policy updates, as well as the market dynamics and policy outlook for each region. By exploring the features, benefits, and potential limitations, investors can gain a comprehensive understanding of how this market mechanism incentivises carbon emissions reduction and fosters environmental stewardship.

At VanEck we believe there is still asymmetric upside for the price of carbon, which remains at levels too low for global carbon targets.

¹ World Bank. 2023. State and Trends of Carbon Pricing 2023. © <http://hdl.handle.net/10986/39796>

Compliance Carbon Market Overview

The compliance carbon market is a regulatory mechanism designed to address GHG emissions by imposing a cap on allowable emissions and creating a market for trading carbon allowances. Under this market, governments establish a predetermined emissions cap, requiring regulated entities to hold enough emission allowances to cover their emissions. These allowances can be obtained through various means including auctions, allocations, and purchasing from other market participants. According to World Bank, ETSs and carbon taxes in operation now cover around 23% of global GHG emissions.²

While only eligible parties can participate in carbon allowance auctions, the secondary carbon credits futures market allows investment from wider groups including carbon emitters, low-carbon innovators/entrepreneurs, investment firms/credit institutions and investment funds such as ETFs³. Motivation to trade in the futures market can range from hedging against movement in allowance prices and volume, taking positions, market making or hedging against inflation. Overall the carbon futures market with various participants can provide liquidity and price formation, resulting in efficient allocation of capital and ultimately achieving emission abatement.

To gain exposure to the world's largest and most liquid carbon markets, various forms of indices have evolved. The ICE carbon futures index, for instance, consists of the four most liquid futures contracts including European Union allowances (EUAs) from the EU ETS, CCAs from the California Cap-and-Trade Program, RGGI and UK allowances (UKAs) which is spun off from the EU ETS post Brexit in 2021. While the EUA is the oldest carbon trading scheme launched in 2005, the RGGI was the first ETS in the US and has grown to include eleven-member states. Since 2015, the total trade value has grown tremendously at 47% p.a. over the past seven years. In particular 2018 and 2022 saw the most significant uptick due to the EUA price surge.

Carbon futures trade value in US\$bn and YoY % change by calendar year

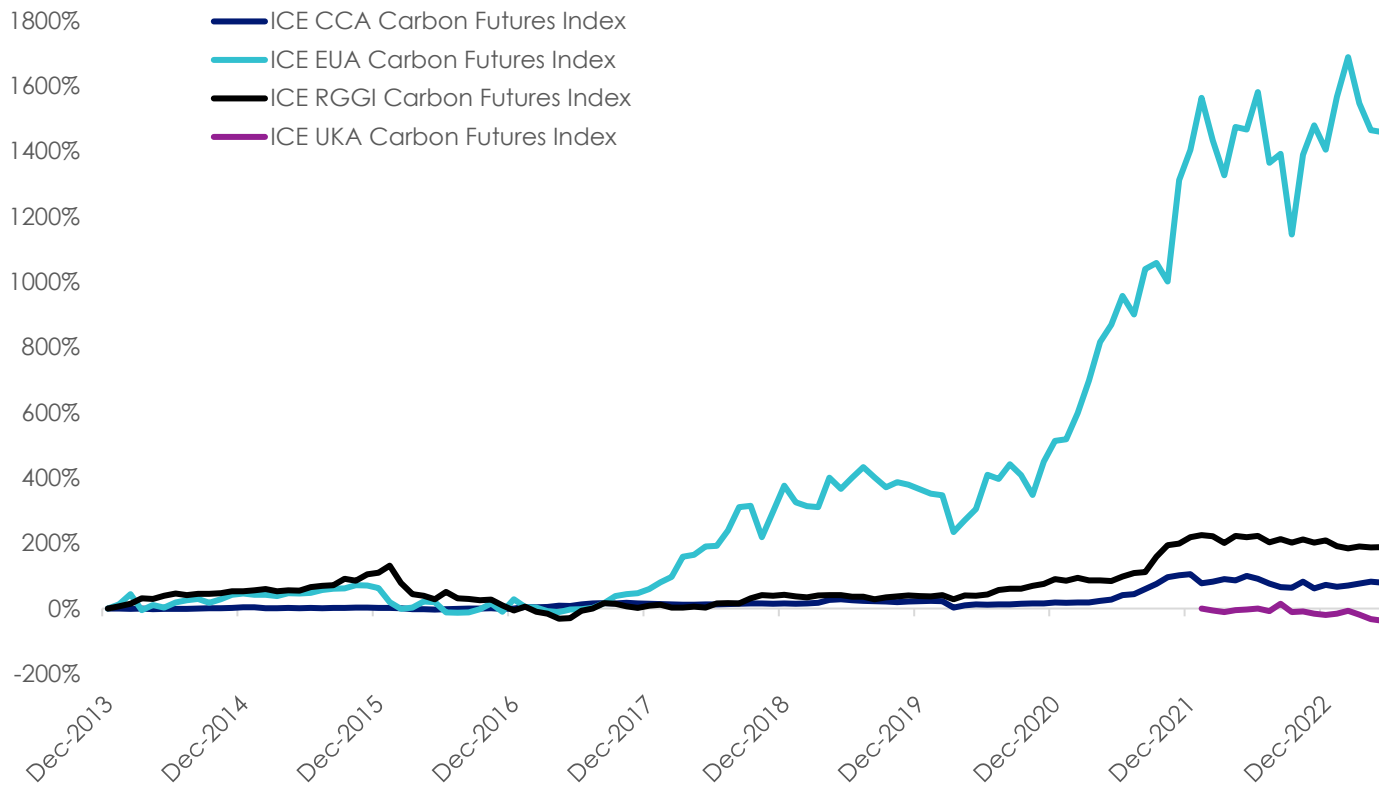
Year	EUAs	CCAs	RGGI	UKAs	Total
2022	628.9 (-4%)	44.5 (1%)	5.8 (77%)	32.8 (88%)	712.1 (-1%)
2021	652.0 (159%)	43.9 (108%)	3.3 (120%)	17.5	716.7 (161%)
2020	251.8 (23%)	21.1 (44%)	1.5 (10%)		274.4 (24%)
2019	205.0 (36%)	14.7 (116%)	1.4 (35%)		221.0 (39%)
2018	150.8 (354%)	6.8 (31%)	1.0 (81%)		158.6 (307%)
2017	33.2 (11%)	5.2 (56%)	0.6 (-57%)		39.0 (13%)
2016	30.0 (-31%)	3.3 (-12%)	1.3 (-1%)		34.6 (-28%)
2015	43.2	3.8	1.3		48.2

Source: ICE

² World Bank. 2023. State and Trends of Carbon Pricing 2023. © <http://hdl.handle.net/10986/39796>

³Oxera, 'Carbon Trading in the European Union', (2022), available at: <https://www.oxera.com/wp-content/uploads/2022/02/Oxera-EU-carbon-trading-report-3.pdf>

Carbon futures returns



Source: Bloomberg. You cannot invest in an index. Past performance is not indicative of future performance.

There are several key price drivers for carbon allowances:

- Changes in current and expected future scarcity of allowances, which is influenced by the supply or the allocation of allowances by governments.
- Variations in general economic conditions; e.g. GDP and industrial production. Generally when economies are doing well, there is greater demand for manufacturing, transport and consumption, hence increasing demand for carbon credits.
- Revisions to the rules of the systems (including those governing offsets and market stability mechanisms), which impact the supply of allowances available.
- Fuel-switching costs among natural gas, coal and oil. According to the U.S. Energy Information Administration, natural gas emits almost 50% less CO₂ than coal⁴. Companies switching from natural gas to coal would create more emissions, leading to increased demand for carbon credits and vice versa.
- The availability of permanent abatement technologies. If more renewable energy becomes financially feasible it will reduce the demand for carbon allowances.

⁴ U.S. Energy Information Administration. Carbon Dioxide Emissions Coefficients.
https://www.eia.gov/environment/emissions/co2_vol_mass.php

Given the substantial growth in the carbon market and more stringent emission reduction goals put in place in various economies, carbon has become an investable asset class as a hedging tool and potentially generating higher uncorrelated returns.

Low correlation to other asset classes

Asset class	Carbon futures	Emerging markets equities	International equities	Australian equities	Australian Property	Global Bonds	Australian Bonds
Carbon futures	1.00						
Emerging markets equities	0.21	1.00					
International equities	0.30	0.46	1.00				
Australian equities	0.15	0.49	0.64	1.00			
Australian Property	0.22	0.38	0.60	0.82	1.00		
Global Bonds	0.00	0.33	0.29	0.29	0.49	1.00	
Australian Bonds	0.05	0.22	0.33	0.17	0.36	0.80	1.00

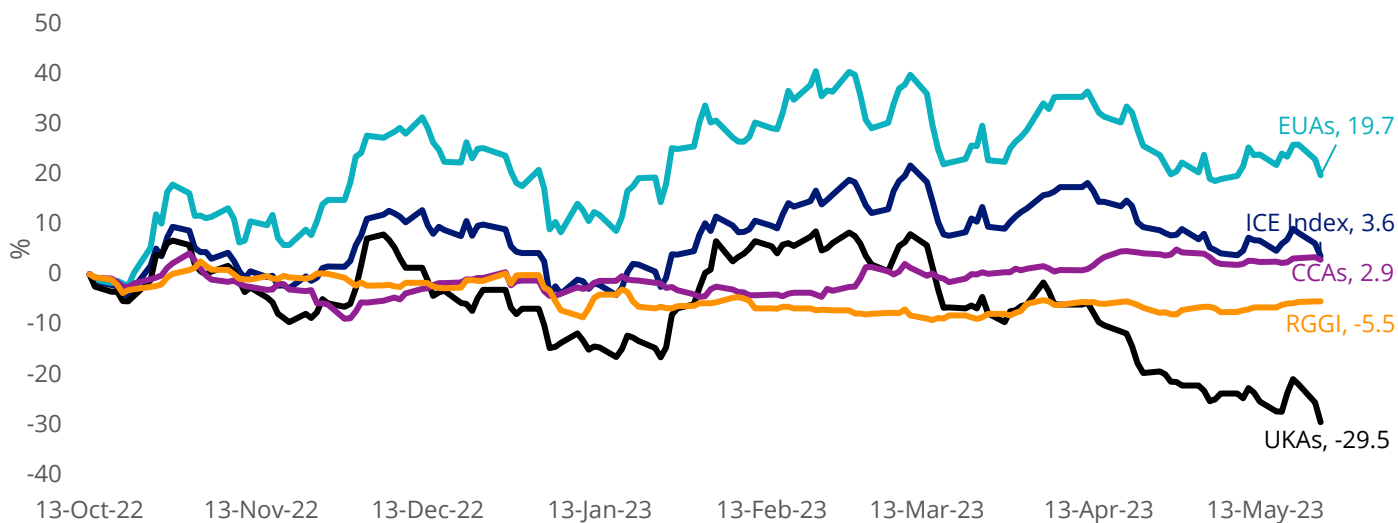
Source: Morningstar Direct, 1 Jan 2014 to 31 May 2023.

Indices used: Carbon Futures is ICE Carbon Index; Emerging Markets Equities is MSCI EM NR Index; International Equities is MSCI World ex Australia Index; Australian Equities is S&P/ASX 200 Accumulation Index; A-REITs is S&P/ASX 200 A-REITs Index; International Bonds is Barclays Global Aggregate Bond Index A\$ Hedged; Australian Bonds is Bloomberg AusBond Composite 0+ years; Bank Bills is Bloomberg AusBond Composite 0+years.

Performance and Policy Update

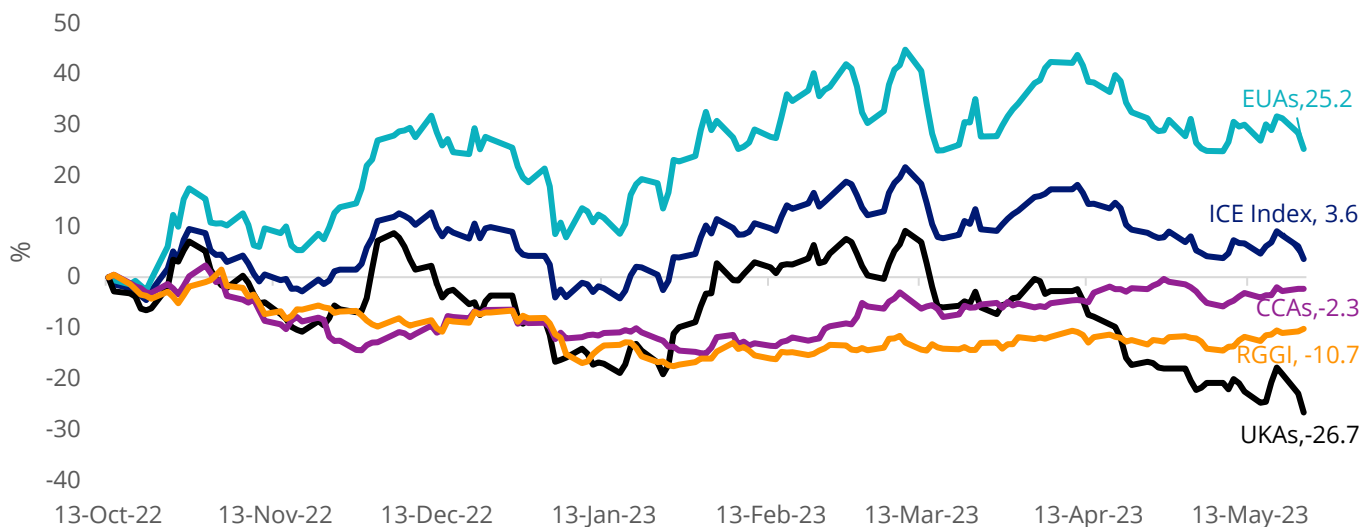
Since 11 October 2022⁵, the ICE Global Carbon Excess Return Australian Dollar Index generated +3.6% at the time of writing⁶. The index currently consists of 56.9% in EUAs, 18.3% in UKAs, 19.9% in CCAs and 4.8% in RGGI. EU allowance prices had a meaningful increase following the passage of the bloc's carbon market reform as part of the Fit-for-55 package, making it more costly for some industries to pollute. UKAs, on the other hand, detracted the most.

Carbon futures returns in local currencies



Source: VanEck, Bloomberg. You cannot invest in an index. Past performance is not indicative of future performance.

Carbon futures returns in AUD



Source: VanEck, Bloomberg. You cannot invest in an index. Past performance is not indicative of future performance.

⁵ Inception date of VanEck Global Carbon Credits ETF (Synthetic) (ASX: XCO2) that aims to track the ICE Global Carbon Excess Return Australian dollar Index.

⁶ 23 May 2023.

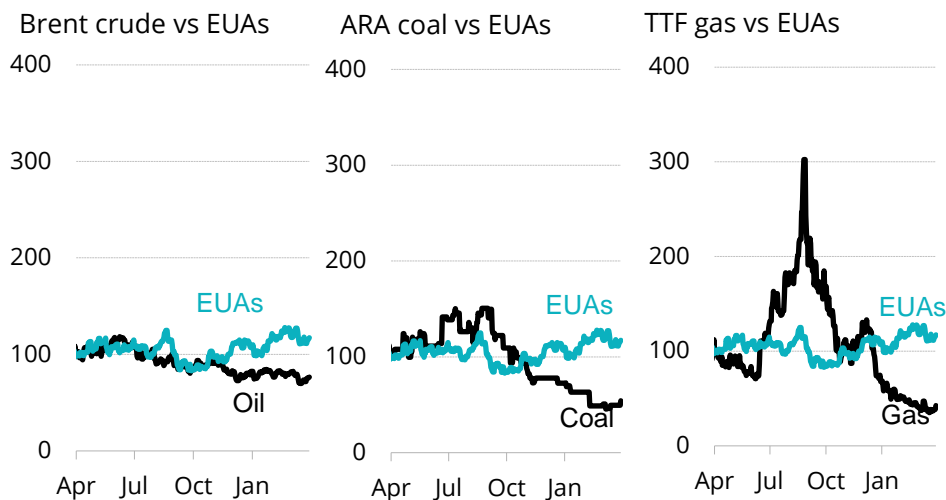
EUAs

Performance

EUAs' price performance has been leading the pack. Earlier this year, driven by demand, the price of the permits on the EU's carbon markets went beyond €100/MtCO₂ for the first time ever. From 2022 the emission level in the bloc remained elevated as high gas prices pushed power sectors to switch from gas to more emission-intensive coal. More coal-fired capacity came back online as the policymakers sought to ensure energy security in light of the Russia-Ukraine war, while hydro and nuclear power generation were sluggish.

A more ambitious emission reduction goal for 2030 would create future scarcity of allowances, providing tailwinds to the carbon prices.

Movement of EUA prices versus key energy commodities across 2022-23



Source: BloombergBNF. April 1, 2022 = 100. EUA price shown is front-December contract. Price benchmarks shown for oil, coal and gas

Policy

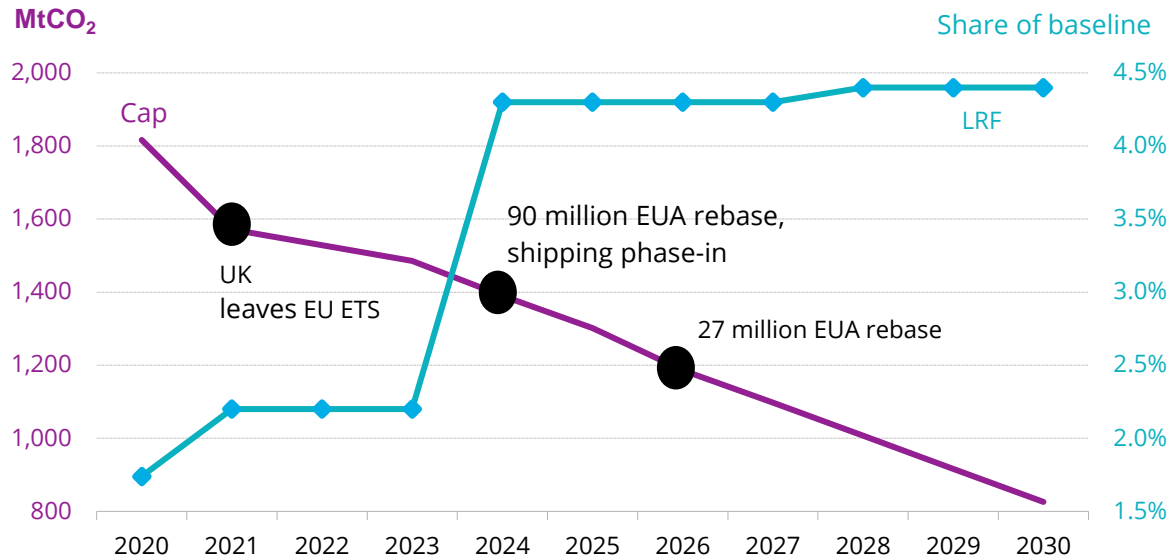
In February this year lawmakers in the EU Parliament's environment committee approved an agreement reached in December 2022 to overhaul the bloc's carbon market, followed by the wider Parliament approval in April.

The reform of the ETS involves boosting emission cuts in certain sectors to 62% by the end of the decade from the earlier 43% compared to 2005 levels. Specifically, the reform is a part of the 'Fit for 55' package – a set of proposals to revise and update EU climate, energy and transport legislation, which will contribute to the EU's climate goals of reducing net GHG emissions by at least 55% by 2030 and reaching climate neutrality by 2050.

To achieve this more stringent target, the deal raises the linear reduction factor (LRF), or the speed at which the emissions cap is reduced, from 2.2% to 4.3% from 2024-2027 and to 4.4% from 2028-2030. Additionally,

the agreement includes two one-off ‘rebasing’ of the cap, reducing it by 90 million allowances in 2024 and an additional 27 million in 2026⁷.

EU ETS emissions cap and LRF



Source: BloombergNEF

Lawmakers also signed off on the EU’s deal on the carbon border adjustment mechanism (CBAM) which aims to encourage non-EU countries to increase their climate ambition and to ensure that EU and global climate efforts are not undermined by ‘carbon leakage’. Upon implementation, importers of goods in iron, steel, cement, aluminium, fertilisers, electricity and hydrogen would have to pay any price difference between the carbon price paid in the country of production and the price of carbon allowances in the EU ETS.

The CBAM will be phased in from 2026 until 2034 while free allowances in the EU ETS is going to be phased out at the same pace. Overall the market tightening is expected to result in a shortage of allowances available and push carbon prices higher.

UKAs

Performance

Being the youngest ETS included in the index, UKAs prices have experienced the most headwinds. Since launch in 2021, the futures prices have been tracking relatively closely with the EUA contracts due to similar market design, before the performance divergence extends from April this year.

⁷ ICAP EU Emissions Trading System (EU ETS) Factsheet. https://icapcarbonaction.com/system/files/ets_pdfs/icap-etsmap-factsheet-43.pdf

The UK government's decision to set a relatively high cap on the total number of allowances available in the first year of the scheme may have contributed to the underperformance of UKAs. This decision was made in part to provide flexibility for companies during the Covid-19 pandemic, but it also meant that there was a surplus of allowances, which put downward pressure on prices.

There may also have been some uncertainty among investors about the long-term prospects for the UK ETS, driven in part by the UK's departure from the EU and the potential implications of the UK's participation in the EU ETS. Despite the underperformance of UKAs in the past year, there are reasons to be optimistic about the future of the market. The UK government has committed to tightening the cap on the total number of allowances available, which is expected to increase demand for UKAs and support prices.

Policy

In March 2022, the UK ETS Authority launched a major consultation proposing to align the ETS trajectory with its net-zero target by rebasing the cap in 2024, alongside a suggestion to reset the share of free allocations available in light of this change. The consultation also sought views on expanding the ETS scope to cover emissions from domestic maritime, waste incineration and energy from waste on the top of the existing power, industry and domestic aviation sectors.

August saw the initial response to the consultation – including covering emissions from flights departing the UK for Switzerland, amending free allocation for 2022 to reflect activity level changes in 2020 caused by the COVID-19 pandemic. A full response to the consultation is expected in 2023, coinciding with the scheme review timeline.

CCAs

Performance

As the broadest carbon pricing system in the US⁸, the California ETS is one of the largest carbon markets in the world. During the period the CCA performance remained more stable compared to other instruments, returning 2.9% in USD or -2.3% in AUD terms.

Its relative steady returns can be attributed to several design features in the cost containment mechanism by the California Air Resources Board (CARB)⁹:

⁸ Sectors cover transport, buildings industry and power with around 75% of the state's GHG emissions based on ICAP data.

⁹ The California Air Resources Board. Cost Containment Information. [https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cost-containment-information#:~:text=Pursuant%20to%20section%2095913\(h\),\(4\)%20of%20the%20Regulation.](https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cost-containment-information#:~:text=Pursuant%20to%20section%2095913(h),(4)%20of%20the%20Regulation.)

- A minimum reserve price for allowances sold at state-run auctions. This acts as a price floor and pegged to inflation plus 5%, preventing the prices falling too low in the event of economic downturns.
- A price ceiling to ensure robust cost containment while delivering the necessary GHG emission reductions.
- Allowance banking which allows participants to save allowances for future compliance, subject to strict holding limits. This flexibility can help smooth out price fluctuations.

Policy

Broadly in 2022, the California Legislature passed four climate bills that codify a 2045 statewide carbon-neutrality target.

The CARB finalised and approved its Scoping Plan at the end of 2022 which includes cutting GHG emissions by 48% below 1990 levels by 2030, an increase from the current 40% statutory mandate. By 2045, the plan would cut emissions by a dramatic 85% below 1990 levels. If translated into the carbon market directly, the annual reduction of supply up to 9% from 4%, leading to a change in market balance. This tightening will reduce future allowances auctions in the market.

RGGI

Performance

RGGI vintage December 2023 traded ranging from US\$12.97 to US\$14.64 for the period. Similar to CCAs, RGGI's performance for the period has not been as volatile as EUAs and UKAs, returning -5.5% in USD or -10.7% in AUD terms.

Generally speaking, the RGGI contract prices would move within a band as the mechanism works in a way that price volatility is managed. More specifically, potential upward price movements are limited by the Cost Containment Reserve (CCR), which allows for the sale of a fixed number of allowances in addition to the cap if the auction clearing price reaches the CCR Trigger Price¹⁰. On the other hand, potential downward price movements are also limited by the Reserve Price, which currently prevents allowances from being sold in the auction at a price below \$2.50, and the Emissions Containment Reserve (ECR), which withholds allowances from circulation if prices fall below an established Trigger Price.¹¹

Policy

Pennsylvania began as a member state in RGGI on 1 July 2022. However, the state is currently under order from the state's Commonwealth Court prohibiting it from actively participating in RGGI related activities. As a result, Pennsylvania did not sell allowances in the 2022 and March 2023 RGGI auctions. The

¹⁰ The CCR Trigger Price was set at \$14.88 in 2023 and will rise 7% each year.

¹¹ The ECR Trigger Price is set at \$6.87 in 2023 and will rise 7% each year.

Department of Environmental Protection of Pennsylvania¹² calculates that the state's involvement could expand the regional carbon market by 80% and accelerate its effort to decarbonise its power sector, reducing 26% GHG emissions by 2025 and 80% by 2050.

¹² Department of Environmental Protection. Regional Greenhouse Gas Initiative.
<https://www.dep.pa.gov/Citizens/climate/Pages/RGGI.aspx>

Carbon Market Outlook

While the carbon price outlook is influenced by changes in climate policies and market conditions, there are a few overarching themes that will drive the demand and supply dynamics:

- Demand side:
 - Energy factors, e.g. gas, oil and coal
 - Macroeconomic factors, such as GDP growth
 - Reduction abatement technologies, such as carbon capture
- Supply side:
 - Climate policy support from governments
 - Carbon allowance reserving and distribution

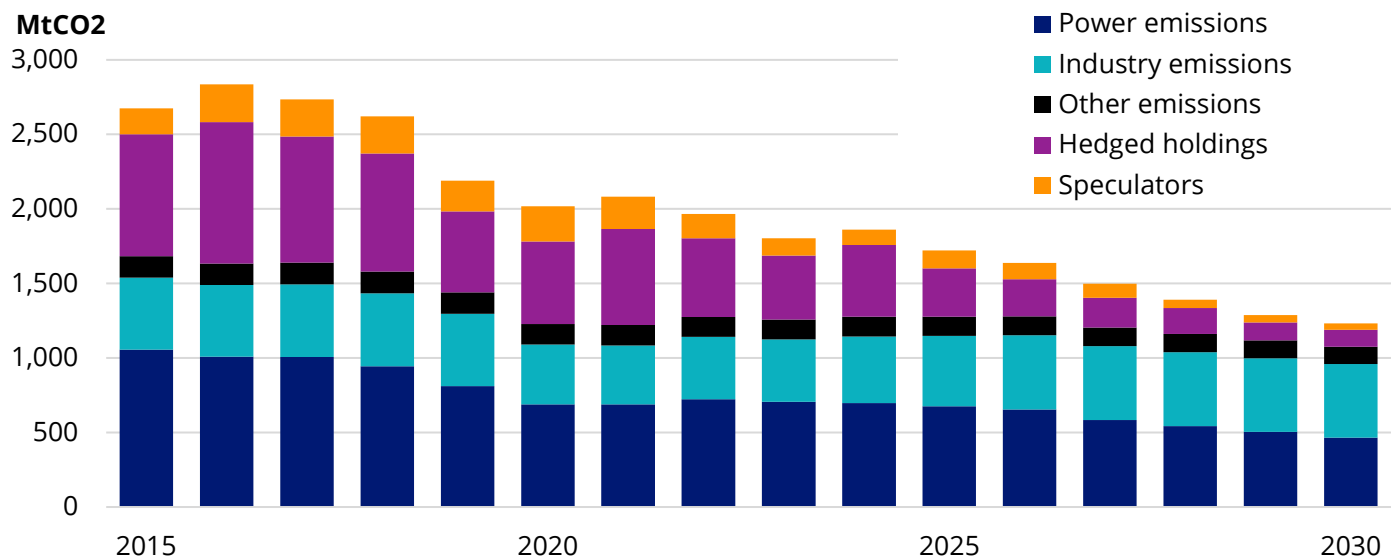
We illustrate some of the market-specific outlook from demand, supply and policy perspectives below.

EUAs

Demand

The major emitters are from power and industry who demand the most carbon allowances, followed by hedged holdings and speculators.

Breakdown of annual EUA demand

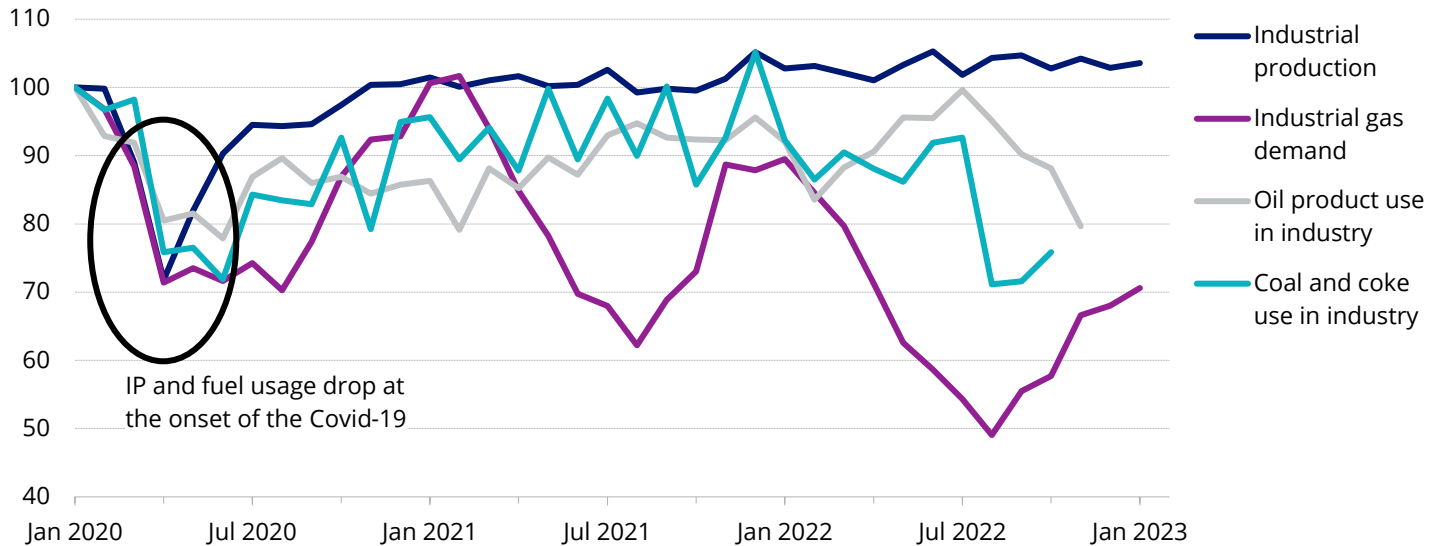


Source: BloombergNEF, European Commission

Since the beginning of 2023 the market witnessed a switch-back from coal to gas due to the normalisation of gas prices since sanctions imposed on Russia. This helped reduce emissions of the power sector so far, and could continue into the remaining decade with the potential recovery of alternative energy generation sources e.g. hydro and nuclear. Lower emissions from the power sector in turn reduces demand for carbon credits.

Industry emissions, on the other hand, remains steady since the onset of the pandemic. The Russia-Ukraine war and surging inflation in the Eurozone recently have not created material impact on the industrial production. Gas demand in the sector has picked up since the August 2022 lows, although around 30% lower compared to the start of 2020. With the introduction of CBAM, industrial companies would have to reassess costs of production as previously they have enjoyed free allocation of allowances. The fuel switching dynamic and level of energy efficiency improvement will dictate the demand for carbon allowances going forward.

EU industrial output and fossil-fuel consumption



Source: BloombergNEF, Eurostat. Data indexed to January 2020 = 100.

Supply & Policy

The policy-driven supply control is supportive of EUA prices. We are currently in the Phase 4 of the EU ETS, during which from 2023 to 2030 the number of allowances held in the Market Stability Reserve¹³ (MSR) will be limited to the auction volume of the previous year. Holdings above that amount will lose their validity¹⁴, which means entities will have to access the allowances via auctions or secondary futures market, leading to increased trading volume as well as liquidity.

From 2024 onwards, maritime shipping would be included in the existing EU ETS as part of the Fit-for-55 package with 78.4 million allowances for the sector via auctions or trading. Shipping companies will be required to gradually surrender obligations under the EU ETS, starting from 40% of verified emissions in 2024, to 70% in 2025 and 100% in 2026. By then the plan will cover 100% of emissions for voyages between member state ports and 50% for those between EU ports and third-country ports. However Bloomberg

¹³ A mechanism introduced in 2019 by the EU regulator to withhold auction volumes equal to total number of allowances in circulation (TNAC) in the previous year multiplied by 24% from 2019-2030. If TNAC is below a threshold allowances would be returned into the market.

¹⁴ ICAP Status Report 2022. https://icapcarbonaction.com/system/files/document/220408_icap_report_rz_web.pdf

estimates that approximately 112 million more allowances are needed for the shipping sector, resulting in a price signal that should incentivise improvements in energy efficiency and low-carbon solutions.

UKAs

Demand

The recent price retreat may prove to be a good entry point, evidenced by the latest ICE trading data as of April 2023. UKA futures traded 34,870 lots, up 21% YoY, while open interest reached 32,862 lots, up 6% YoY and 16% MoM. The UKA Auctions on 5 April and 19 April cleared all volume (3,154,500 lots each).

The demand for UKAs is primarily driven by the emissions reduction targets set by the UK government. We think the demand for UKAs is likely to increase given their commitment to achieve net-zero target.

Supply & Policy

The scheme is due for review in 2023 and 2028, with ongoing reforms and tweaks of specific elements in the meantime.

Between March and June 2023, the UK government will have consultation considering a range of potential policy measures to mitigate carbon leakage risk in the future and ensure UK industry has the optimal policy environment to decarbonise. Potential policies include CBAM, mandatory product standards (MPS), and other policy measures to help grow the market for low carbon products.

There are reasons to believe that the market will recover in the coming years as the UK government takes steps to support the market and address oversupply issues that may be impacting prices.

CCAs

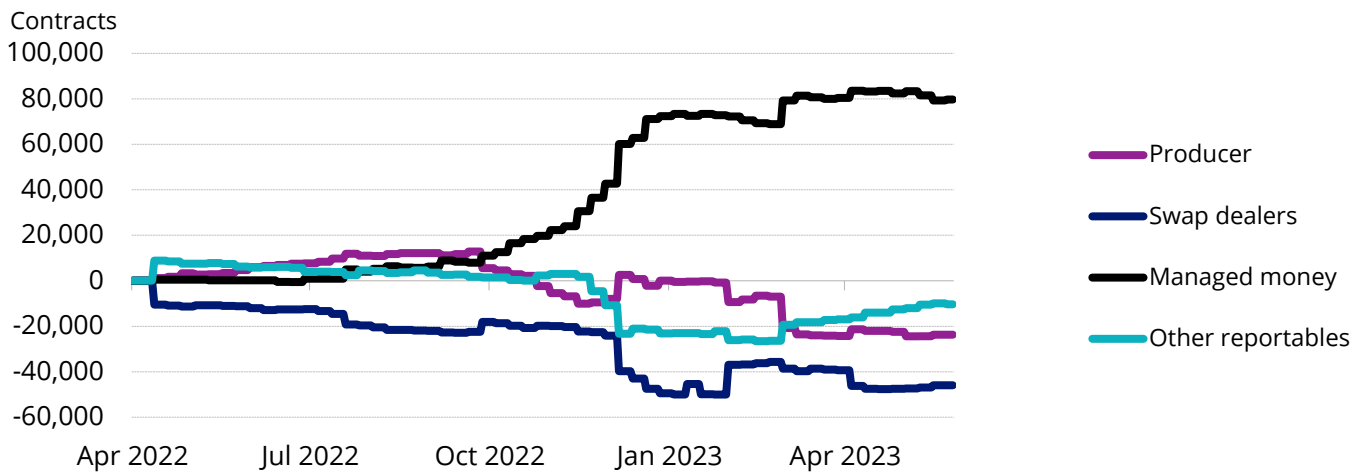
Demand

The demand for carbon allowances in California has been high from both the auctions and the secondary futures market and we expect the trend to continue as investors look for hedging instruments in the high-inflation environment.

The latest joint auction between California and Quebec held in May 2023 cleared all allowances available for both 2023 and 2026 vintage at US\$30.33 and US\$30.05 respectively.

The futures market has been echoing the trend. The net positions (long and short) held by various players in the CCA futures market show the strongest growth originates from Managed Money who are engaged in managing and conducting organised futures trading on behalf of clients, examples include hedge funds, pension funds, registered US commodity trading advisors or commodity pool operators.

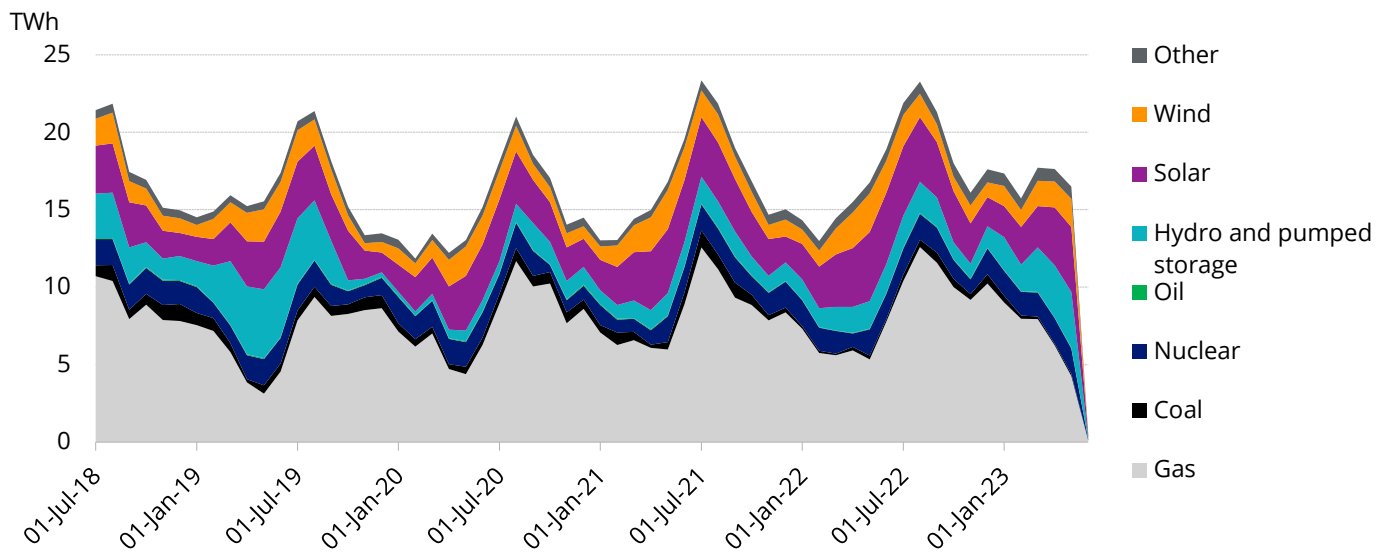
Net positions for CCA futures Vintage 2023¹⁵



Source: BloombergNEF, Commitment of Traders

On the other hand, we are on the lookout for the power generation this year which may experience emissions decline following the recovery of generation from renewable sources such as hydro. This could dampen the demand for allowances and weigh on prices.

Power generation by fuels



Source: BloombergNEF

¹⁵ Producer: An entity involved in the production, processing, or merchandising of a commodity.

Swap dealers: An entity that deals primarily in swaps for a commodity and uses the futures markets to manage or hedge the risk associated with those swaps' transactions. The swap dealer's counterparties may be speculative traders, such as hedge funds, or traditional commercial clients that are managing risk arising from their dealings in the physical commodity market (e.g., Investment Bank).

Other reportables: Every reportable trader that is not placed into one of the other three categories is placed into this category.

Supply & Policy

From the latest auction statistics, the cover ratio¹⁶ for 2026 vintage is higher than the current-year vintage, indicating the expectation of future scarcity of allowances.

On the policy front, while there has been pushback passing through the more ambitious emissions goal with the California Senates' Appropriations Committee, California will most likely continue to lead the US in the development and implementation of climate policies and regulations.

It is announced that California and Quebec will hold a joint workshop on 14 June to work on the reforms of their linked carbon market, which is positive to ensure the effectiveness of the program.

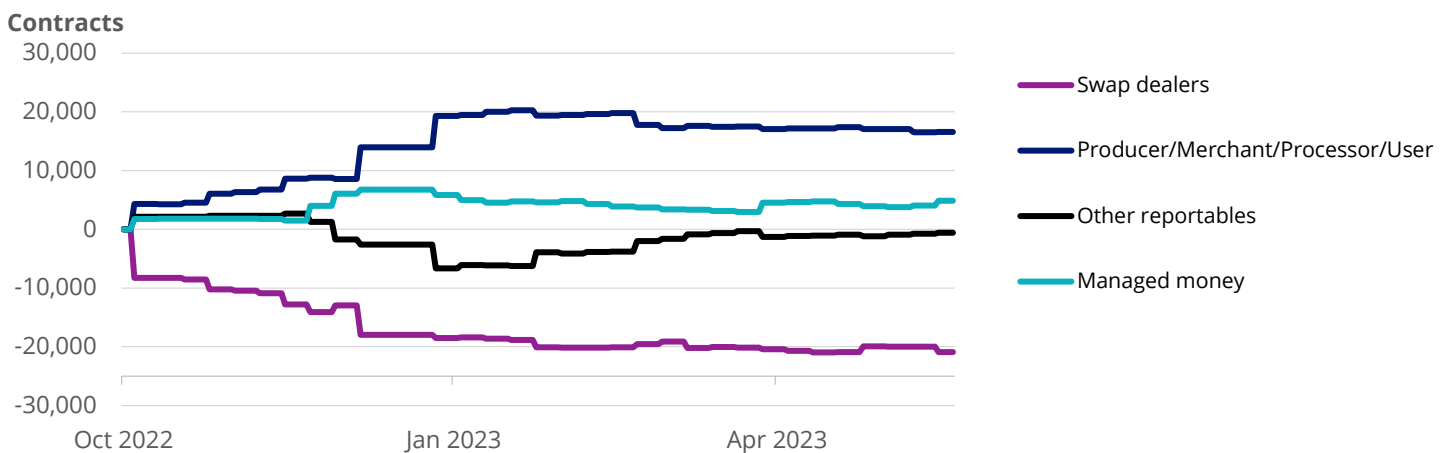
RGGI

Demand

The demand for carbon allowances in the Northeastern states has been resilient, evidenced by latest quarterly auction in March auction with all allowances sold at a clearance price of US\$12.50.

In the secondary futures market, the major net long positions are held by Producer / Merchant / Processor / User entities whereas Managed Money has stayed muted potentially due to the smaller weight in carbon futures indices.

Net positions for RGGI futures Vintage 2023¹⁷



Source: BloombergNEF

¹⁶ Cover ratio is defined as the total bids divided by total allowances available.

¹⁷ **Producer:** An entity involved in the production, processing, or merchandising of a commodity. **Swap dealers:** An entity that deals primarily in swaps for a commodity and uses the futures markets to manage or hedge the risk associated with those swaps' transactions. The swap dealer's counterparties may be speculative traders, such as hedge funds, or traditional commercial clients that are managing risk arising from their dealings in the physical commodity market (e.g., Investment Bank). **Other reportables:** Every reportable trader that is not placed into one of the other three categories is placed into this category.

In 2022 the RGGI price was supported by high emissions in the power sector and low levels of free allowances. Going forward it may potentially have downside risk if the emissions drop resulting from less heating demand during a mild winter.

Supply & Policy

The participating states in RGGI have been developing an analysis of the electricity sector that will inform decision making around core Program Review topics, as part of the RGGI Third program review. It will be concluded and implemented at the end of 2023 which is anticipated to spur investor momentum in carbon markets.

It remains open whether Pennsylvania and Virginia (withdrawal process ongoing) remain members of RGGI amid the legal battle, while North Carolina may join RGGI later this year, subject to rulemaking timeline. The membership change will affect the supply of allowances and also impact prices.

Conclusion

Carbon allowances prices are overall rising across the globe as climate ambitions ramp up to achieve the net-zero target.


We are bullish on the long-term outlook for carbon permit prices in compliance markets as they remain the policy tool of choice for incentivising abatement, further the current environment could potentially be a compelling entry point as an inflation hedge because the pricing of carbon credits futures are inflation-linked in many schemes. Carbon credits also exhibits low correlation with the traditional asset classes, providing diversification benefits in investors' portfolios.

Key risks

There are risks associated with all investments. An investment in XCO2 carries risks associated with: ASX trading time differences, market risk, concentration risk, futures strategy risk, cap and trade risk, currency risk, political, regulatory and tax risks, fund operations and tracking an index. See the PDS for details

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