Carbon Cap-and-Trade: We See a Compelling Opportunity

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We see attractive investment opportunities in California's cap-and-trade carbon emissions market.

- *To combat climate change, policymakers are increasingly adopting "cap-and-trade" programs, which typically issue a declining number of greenhouse gas (GHG) emission allowances each year, capping the pollution businesses can emit.*
- *Carbon allowance supply will, in our view, shrink faster than covered entities can move to green power technologies, supporting allowance prices.*
- *California represents one of the most attractive carbon markets, with mechanisms to prevent emission prices from falling too low or rising too high.*
- *We believe that as California Carbon Allowance (CCA) demand eclipses an ebbing supply, more investors will enter the market, boosting CCA demand and price – benefiting those who invested early.*

As the international community races to combat climate change, policymakers are increasingly adopting a range of market-based incentives to reduce carbon emissions. Key among these are cap-and-trade programs. Cap-and-trade systems limit the total amount of carbon that can be emitted (cap) and allow the market to determine the price where the demand to emit matches the supply of allowances (trade). In essence, cap-and-trade programs use market forces to put a price on carbon, and this price on carbon creates a cost for companies and incentivizes them to reduce emissions.

How Does Cap-and-Trade Work?

A cap-and-trade system typically issues a declining number of emissions allowances each year – capping greenhouse gas (GHG) emissions. Covered entities – primarily companies that generate electricity, supply transportation fuels and natural gas, or operate large industrial facilities – acquire emission allowances. They do this in different ways, but typically it is some combination of receiving allowances directly from the program administrator or buying allowances in an auction, or buying allowances in the secondary or futures market. Covered entities then surrender carbon allowances commensurate with the amount of carbon they emit each year. It is similar to how individuals and companies pay taxes, but instead of declaring income and paying in a given currency, they declare carbon emissions and pay with emission allowances.

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Cap-and-trade allowances tend to be oversupplied in the program's early years and undersupplied later because the supply of allowances typically declines steadily over time. As the supply of allowances declines, the cost to reduce emissions typically increases and the market must provide greater incentives to balance demand with shrinking supply. Initially, a region can often reduce its carbon footprint by switching from coal to natural gas for power generation – a straight-forward, relatively low-cost move that cuts emissions in half. It's the proverbial low-hanging fruit for reducing emissions. However, additional savings – such as switching from natural gas to renewables power – tend to be more expensive and require greater time to implement. Outside the power sector, solutions to decarbonize tend to be much harder to come by. As covered entities struggle to find cost-effective ways to reduce emissions, many are expected to opt to keep emitting and purchase more allowances. This continued demand coupled with steadily falling supply is expected to increase the price for allowances and the rising market-based price gives participants an incentive to find the most cost-effective way to reduce emissions.

With supply shrinking faster than demand and the price of emission allowances below where we believe technology can be deployed to reduce emissions, we view emission allowances as an attractive investment opportunity across cap-and trade programs. Still, there are meaningful differences across programs, which we believe makes owning certain allowances more attractive than others.

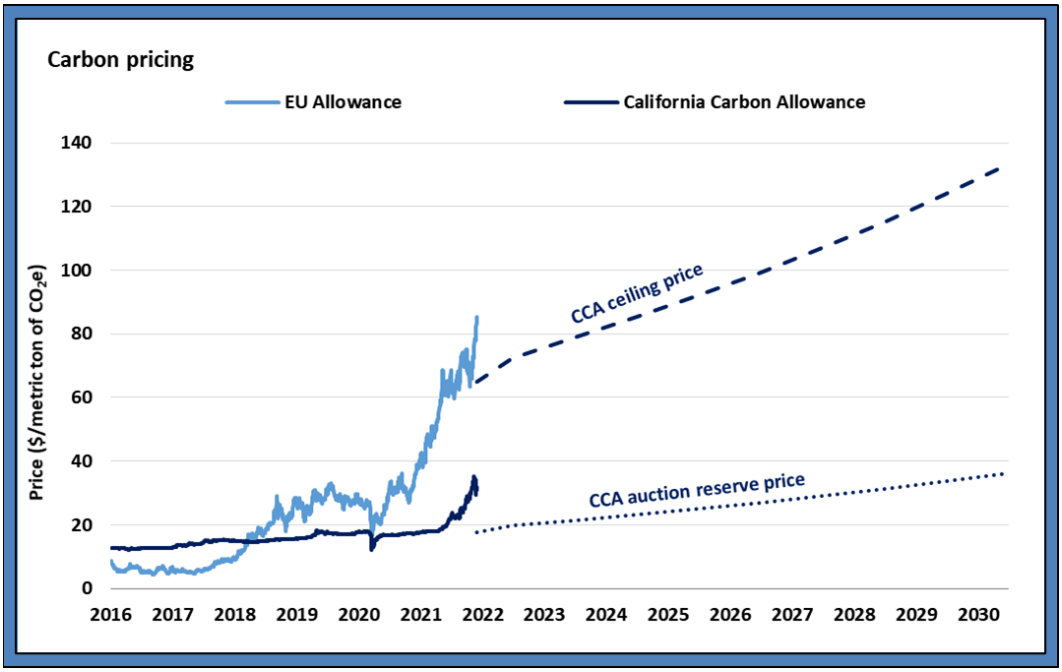
California Carbon Allowances

In our view, California represents one of the most attractive carbon markets. Launched in 2013, the California Air Resources Board (CARB) designed its cap-and-trade program with the benefit of having observed how supply-demand dynamics evolved in other markets (primarily the European market, which launched in 2005) and impacted prices. California's program addresses key concerns of a cap-and-trade program: that emissions prices are volatile, falling *too low* in economic downturns, melting incentives to reduce emissions, and rising *too high* in better economies, unreasonably burdening manufacturers and other major power consumers, potentially prompting them to leave the state.

Price floor. To address the risk of falling allowance prices, California has introduced an auction reserve price, placing a quasi-price floor under its auction of emission allowances. Thus, if bids do not meet at least the auction reserve price, the supply of allowances would be curtailed, supporting the trading price. This floor price rises yearly at a rate equal to the consumer price index (CPI) plus 5% (see Figure 1 on the next page). The escalating price can be viewed as an acknowledgement that in the beginning of a cap-and-trade program there are easy ways to decarbonize, and as time goes on and the low-hanging fruit has been picked, the market will likely need to provide greater incentives to reduce emissions.

Price ceiling. To limit how expensive California carbon allowances (CCAs) can become for compliance entities, California instituted a ceiling price for CCAs (see again Figure 1 on the next page). And at the ceiling price, supply becomes infinite. This ceiling price – currently about 2-3x the current price of CCAs – essentially caps the cost that companies, and the economy overall, can incur in pursuing these decarbonization objectives. In addition to outright limiting prices at the ceiling, CARB also implemented speed bumps for prices on the way to the ceiling. At prices fixed at 50% and 75% of the distance between the floor and the ceiling price, CARB would supply compliance entities with a limited amount of additional allowances outside the typical auction process.

Figure 1



Note: Auction Reserve Price and Ceiling reflect inflation swap pricing.

Sources: PIMCO, Bloomberg, and California Air Resources Board as of 30 November 2021.

ESG Considerations of CCA Investing

California carbon allowances may have a natural fit in environmental, social and governance (ESG) portfolio allocations. CCA investors help provide the liquidity and efficient price discovery essential to a well-functioning CCA market. The revenues that are generated by auctioning off CCAs are invested in various ESG-positive projects such as renewable energy, public transportation, recycling, and affordable housing. Thus, by purchasing physical CCAs, investors are helping to fund various projects that help to decarbonize the California economy and also give companies that emit a greater incentive to reduce their emissions.

Two CCA Valuation Methods

Given the unique floor price mechanism of CCAs, we can apply two different valuation frameworks. The first method values the auction reserve price (*i.e.*, approximate price floor) and compares it to current market prices, while the second takes the more traditional route of applying a supply-demand forecast to CCAs.

Valuation Based on Auction Reserve Price Mechanism

The auction reserve price represents a longer-term lower bound since auction supply drops to zero below this price. As such, we view the auction reserve price as a reasonable assumption of the *minimum* value of CCAs in the long run. Given that the current auction reserve price is known and that it escalates at a rate of CPI+5% every year, we can estimate a future value of the auction reserve price using inflation swap rates. Today's auction reserve price is $17.71 and using inflation swaps we would expect the 2030 reserve price to be about $36. We can then discount the 2030 auction reserve price back to today using current interest rates plus some additional spread to compensate for policy and liquidity risk. If we use a spread of 150 basis points (bps) over Treasury rates (1.55% to 2030), we get a discounted floor value of approximately $29. This means that if you could buy CCAs at $29 and then sold them at the floor in 2030, you would get a return of Treasuries plus 150 bps, or roughly 3%. Naturally, determining the intrinsic value of the price floor likely falls short as a true estimate of how much CCAs are worth.

To get a better fair value estimate, one should also account for the optionality of owning CCAs. After all, there is a chance that prices go much higher than the floor, possibly to the ceiling. What is that option worth? Well, that's debatable, but current implied volatility for a 1-year option is about 40%-50%. Longer-term options don't trade, but let's haircut that implied volatility to 30% and look at what an at-the-money $36 call maturing in 2030 would be worth. That option is worth about $8. This means that the fair value of a CCA using the forward floor and an estimate of the option premium should be roughly $37. In other words, without taking a fundamental view on where CCA prices should go, today a CCA should be worth almost the same value as the 2030 forward floor.

To put this in context, the current CCA price is around $31. This price provides an implied return roughly in line with Treasuries, with further upside should emissions not fall as fast as supply. To be clear, even once CCAs reach $37, we believe they can still be an attractive investment – at that entry point investors should earn a fair rate of return for the risk they take. In our view, today's price reflects the undeveloped state of this new market.

Valuation Based on Supply-Demand Expectations for CCAs

Ultimately, supply-demand dynamics are expected to drive carbon prices. Absent prices being at the ceiling or a change to the program, carbon allowance supply will drop by nearly 40% between now and 2030. Actual emissions, *i.e.*, demand for allowances, can be thought of as a function of GDP growth, population, market share of electric vehicles, renewables' share of power generation, and other variables. Looking at future supply relative to our demand projections, we see supply falling below demand in the next year. It will be challenging to decarbonize the economy at the pace supply falls without providing meaningful financial incentives for companies to make the necessary investments in clean(er) technologies. For this reason, we think investors may benefit by entering the market during the early years when supply is still plentiful.

While each cap-and-trade program is unique, it may be worthwhile to look at price developments in other, more established, jurisdictions, where the reduction in supply is more advanced and where prices could better indicate when alternative technologies become competitive.

For example, in Europe, emission allowances for an equivalent metric ton of carbon trade above $80, more than double the price of CCAs, without causing major harm to regulated entities. While prices in different regions are likely not directly comparable, in our view this does offer some validation that the price range California has anticipated, with a ceiling price of $72 in 2022, rising to $130 by 2030, is within reason.

Our Outlook for the California Carbon Allowance Market

The CCA market covers emissions across 85% of the California economy. There are currently in excess of 300 million metric tons of carbon allowances, making it one of the largest emissions trading systems in the world (Center for Climate and Energy Solutions). We believe that as the CCA demand eclipses an ebbing supply, more investors will enter the market, further boosting CCA demand and price – benefiting those who invested early. This cycle will continue until companies emit less carbon and demand for allowances eases. Until this happens, the price of carbon should continue to rise. As a society, we believe we must reduce carbon emissions in order to ensure a future as bright as possible for future generations. Involvement in the cap-and-trade market helps achieve that goal by setting the price where companies will be compelled to change their behavior and make investments to reduce greenhouse gas emissions.

Endnote

A version of this article was previously published as a PIMCO "Featured Solution."

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Most recently, Nic was a managing director in PIMCO's Newport Beach office. As portfolio manager and Head of Commodities, Nic focused on commodity, carbon, and multi-asset strategies. He specialized in structural risk premiums as well as overall portfolio construction, and led the commodity portfolio management group. In 2012 he co-authored "Intelligent Commodity Indexing," published by McGraw-Hill. Prior to joining PIMCO in 2004, he was a research fellow at NASA's Jet Propulsion Laboratory, helping to develop Mars missions and new methods of autonomous navigation. He has 18 years of investment experience and holds a Master's degree in Financial Mathematics from the University of Chicago and an undergraduate degree from California Polytechnic State University.

Nic is also a member of the J.P. Morgan Center for Commodities' Advisory Council.

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Klaus is a Founding Partner and Co-CIO of Klima. He is a carbon and commodity market expert who views climate change as the defining challenge of our generation. Since 2018, Klaus has focused on carbon markets and played a principal role in building out the carbon investing efforts for a global asset manager. Prior to joining Klima in 2022, Klaus spent 10 years at PIMCO, serving as the lead strategist for PIMCO's global commodity and carbon offerings. Klaus holds an M.B.A. from The Wharton School at the University of Pennsylvania, where he graduated Palmer Scholar (highest academic distinction). He received undergraduate degrees in international business from Northeastern University, Boston and from ESB Reutlingen, Germany. Klaus is a CFA® charterholder and also holds the Financial Risk Manager and CAIA® designations.