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# Making sense of carbon price forecasting

## The predictive power of commodity analysts and forward curves

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IN A NUTSHELL

- Over the past few years, carbon markets have captured increasing attention. This has been accompanied by a number of investable products emerging. Even so investors remain confused as to what lies ahead. We exmaine price fundamentals in this paper, which complements our carbon research published earlier this year[1].
- There are already around 100 countries identifying carbon pricing schemes as a central pillar of their net zero strategy[2]. As a result, understanding the pathway for regional and global carbon pricing has become more important than ever
- In addition, as an increasing number of corporates are also stress-testing an internal carbon price, and in some instances using this carbon price in business decision-making, providing forward guidance to carbon pricing is becoming increasingly warranted
- When it comes to price forecasting, we find that those commodities with higher levels of volatility, such as European carbon prices, have significantly higher associated forecasting errors. According to our calculations, if the consensus analyst forecasting error over the past decade persists into next year, it implies an average EU carbon price of €97/tonne, compared to today's current spot price[3] of €68/tonne
- When it comes to the track record of commodity analysts versus the respective forward curve as a predictor of the coming 12-month price, our work finds commodity forwards typically outperform the consensus analyst in the accuracy of their predictions, although mercifully for the analyst community by only a small margin
- We are long-term bullish for European carbon prices reflecting fuel switching trends in the short-term and strong supply-side fundamentals over the long-term. However, a more dramatic downturn in industrial activity in Europe and an accompanying spike in risk aversion naturally pose downside risks
- We also believe that the sell-off in global bond yields may have an impact as carbon prices are the net present value of future environmental liabilities discounted in today's value. However, rising inflation ought to have a neutralising effect as it affects both sides of the equation (numerator and denominator), unlike a nominal bond.[4]

[1] DWS Research Institute (February 2022). Carbon pricing and carbon allowances; Carbon markets: the why, what & where
[2] World Bank (May 2021). State and Trends of Carbon Pricing 2021
[3] Bloomberg Finance LP as of October 18, 2022
[4] In an upcoming research paper, we will explore the fundamentals of carbon prices from the perspective of the carbon budget, emission costs and discount rates

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# 1 / Analyst forecasting errors

## It's all about the vol

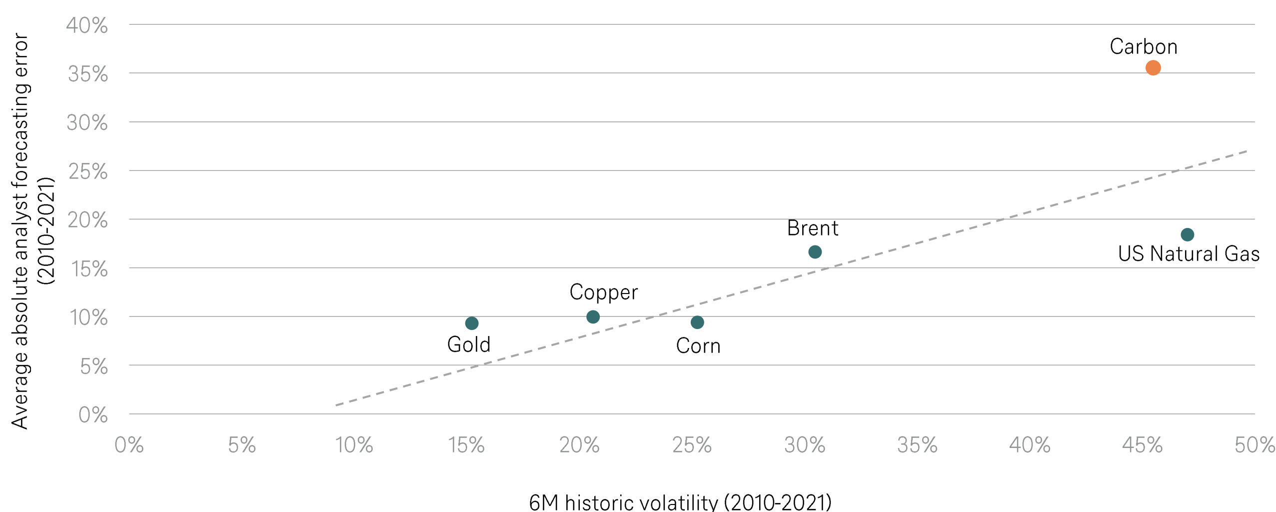
Not all commodities are equal when it comes to price forecasting. Figure 1 compares commodity volatility on the one hand with the average absolute analyst forecasting error for various commodities over the past decade. To calculate the forecasting error, we take the consensus forecast for each commodity at the start of the year and compare it with the final price outturn. The chart shows a clear positive correction: namely, the higher the volatility, the larger the analyst forecasting error for that commodity.

This work suggests that you can have a relatively high degree of confidence when it comes to the year ahead price forecast for gold and copper since price forecasts typically only diverge from the final outturn by no more than 10%. But when it comes to energy commodities, you need to take price forecasts with a heavy pinch of salt. Our analysis shows that commodities within the energy complex such as Brent crude oil and US natural gas have higher levels of volatility which are associated with large forecasting errors particularly compared to base and precious metals. A large part of this volatility divergence can be explained by the variation of consumption-to-inventory ratios across the commodity spectrum, which are typically lower for metals and higher for energy commodities.

When it comes to commodities within the energy complex, one commodity stands out, EU carbon prices. These have historically been the most challenging with an average absolute forecasting errors of 35%, or more than three times that of gold. Also noticeable is how the size of the forecasting errors over the past decade has been rising significantly and specifically from 2018 onwards as carbon prices have found a possible new and higher price plane.

Assuming the consensus price forecast for next year does not change between now and year end, and that the historical forecasting error between 2010 and 2021 persists into next year, it would imply an average 2023 EU carbon price forecast of €97/tonne (€71.6 x 1.35) or c.45% above the current spot price.

**Figure 1: The higher the volatility, the larger the consensus analyst forecasting error**




Source: DWS Research Institute, Bloomberg Finance L.P (October 2022). We take the Bloomberg median commodity forecast for each commodity at the start of the year and compare with the final outturn. We then calculate the average absolute forecasting error

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# 2 / Forwards versus analysts

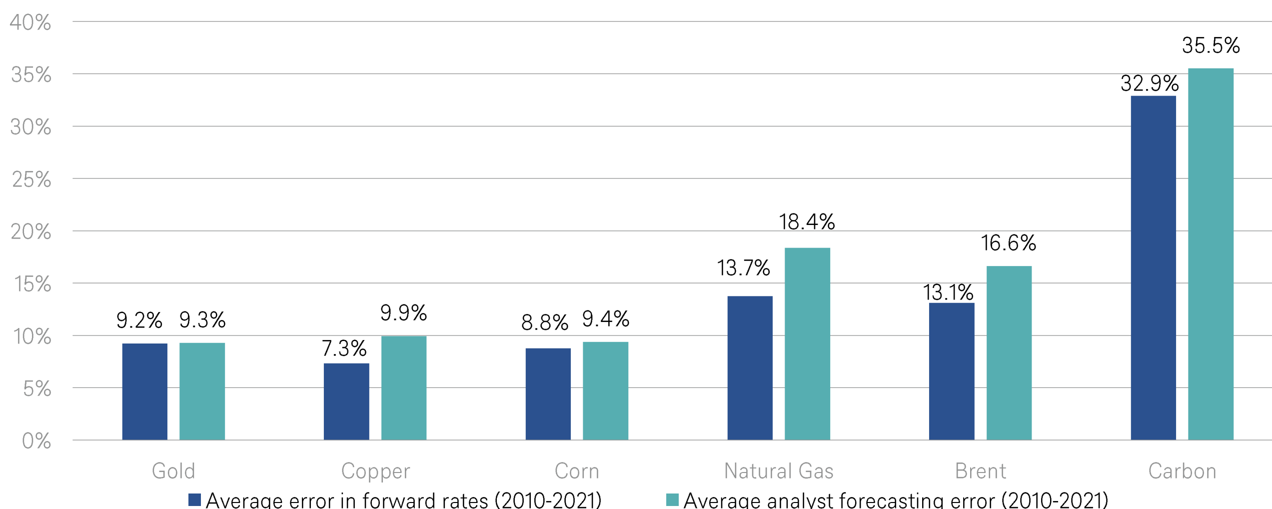
## Track records compared

To get a sense of how the track record of the commodity analyst community compares to financial markets, we compare how well analysts perform versus commodity forward curves. We calculate the forecasting error of the forwards by examining the calendar forward for each respective commodity at the start of each year and compare it with the final price outturn.

Similar to the results from analyst forecasting errors, the forward curves show a tendency to register an increasing forecasting error of the forwards in line with the level of the volatility, Figure 2. In addition, European carbon prices are at the top of the forecasting error naughty list. Also telling is that the forecasting error of the forwards is lower than the consensus analyst across all commodities. This might suggest that when it comes to commodity price forecasting, it might be wise to play more respect to the forwards than the analyst community.

Assuming the current 2023 calendar forward price remains unchanged between now and year end, and that the historical forecasting error between 2010 and 2021 persisted into next year, it would imply an average 2023 EU carbon price forecast of €97/tonne (€72.8 2023 cal' forward x 1.33).

**Figure 2: Forwards are better at predicting commodity prices than the consensus analyst**




Source: DWS Research Institute, Bloomberg Finance L.P (October 2022). We plot the average analyst forecasting error with the calendar forward at the start of the year and compare that to the final price outturn



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# 3 / Carbon market drivers

## Multiple factors at play

Figure 3 provides what we see as the key drivers of European carbon prices. We view the general economy and the risk-off environment as potentially the two most bearish factors for carbon prices over the coming year.

**Figure 3: Key drivers of European carbon prices**

| Category | Driver | 12M Signal | Comment |
|---|---|---|---|
| Fundamentals | General economy | -1 | Economic activity across Europe is slowing down and we view a further slowdown in industrial activity as the main risk reversing the strength in carbon prices witnessed over the past two years |
| | Policy | +1 | Phase 4 of the EU ETS started in 2021 with a further tightening in the supply of allowances. This reflects the EU's more ambitious targets to cut emissions by at least 55% from 1990 levels by 2030. We see this as providing a bullish backdrop for carbon prices |
| | Risk on/off | -1 | Geopolitical tensions have had a negative impact on the performance of equities and risk-on assets. If this persists, then the contagion risk is likely to weigh on carbon prices |
| | Fuel switching | +1 | The reduction in natural gas supplies from Russian is pushing more countries, such as Germany and the Netherlands, to allow the shortfall to be filled through coal-fired powered generation. This should help to underpin the demand for EU ETS as emitters require additional permits to pollute. Extreme cold this winter may drive greater coal use and so upside carbon price risk |
| | Market Stability Reserve (MSR) | 0 | The Market Stability Reserve (MSR), a mechanism to curb oversupply, removed significant EUAs from auctions between September 2020 and August 2022. However, the Russian crisis has temporarily altered the outlook in response to the RePowerEU plan which means the MSR being used to fund climate objectives |
| | RePowerEU | -1 | As part of the RePowerEU strategy to reduce the region's dependency on Russian fossil fuel imports, and raise €20 billion in climate funds, the European Commission plans to sell allowances from the Market Stability Reserve out to 2026. This is potentially bearish for the price of EUAs |
| | Industrial activity | +1 | Industrial decarbonization refers to hard to abate emissions. These emissions need to be compensated by removal of carbon from the atmosphere over the long term. According to the IEA, the required CO2 price for carbon capture in processes such as cement production and power generation are in excess of €100/tonne and would call for even higher carbon prices |
| Technicals | Liquidity and volatility | 0 | With fluid European growth expectations, as well as volatility in the gas market, these may reduce volumes from the carbon market. Overall market liquidity remains low for front-year futures, and this may present "gap-risk" for carbon prices |
| Net outcome | | +1 | We expect the carbon supply situation to remain tight which should be supportive of prices. Escalated gas prices should remain a demand driver for EUAs on the back of incremental coal supply turning viable. However, the risk of a more pronounced downturn in industrial demand as the main risk to the bullish outlook into next year |

Source: DWS Research Institute, Bloomberg L.P. BNEF (October 2022), Factors are not weighted equally

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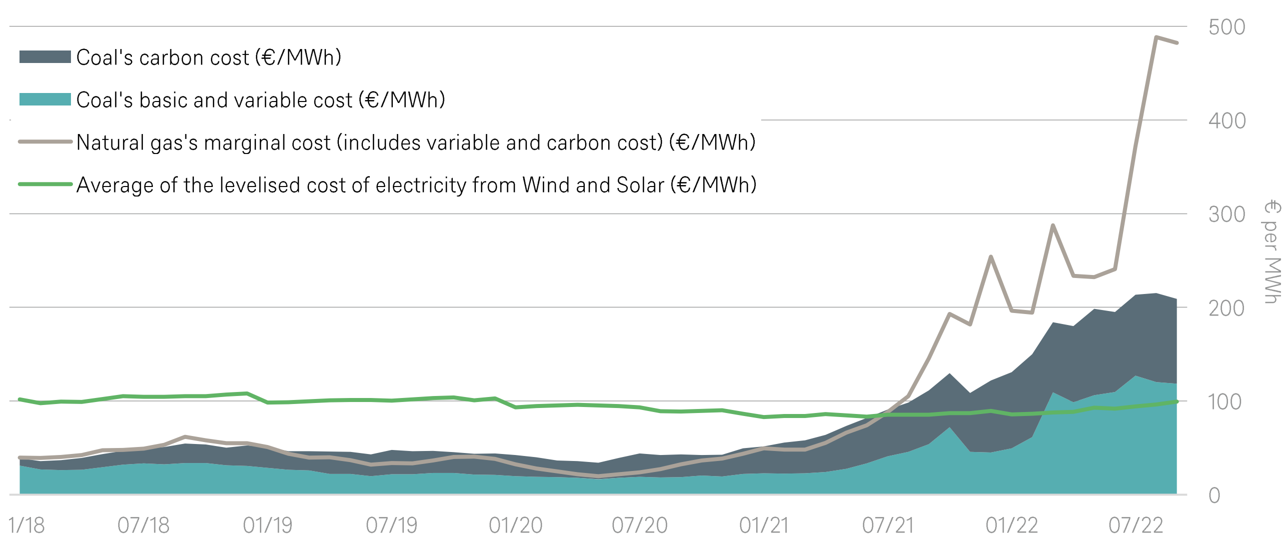
In contrast, two bullish factors for European carbon prices are, in our view, fuel switching and supply trends in the European carbon market. When it comes to fuel switching, Figure 4 examines the various feedstocks for power generation, namely coal and natural gas. The most dramatic change in pricing over the past year has been in natural gas following the Russian invasion of Ukraine. This has meant that the tendency for natural gas to displace coal before 2021 has been reversed meaning it is more competitive to switch to coal for power generating purposes.

With Germany, the Netherlands, Austria and some other European countries now permitting coal burning for power generation[5], this is increasing the demand for EU carbon permits, and so providing upside momentum for European carbon prices. Just as the summer drought in Europe has hit hydro- and nuclear-power generation capacity, colder weather this winter could lead to even greater demand for coal burning and consequently strong demand for carbon allowances.

**Figure 4: The economics behind fuel switching**




Source: DWS Research Institute, TransitionZero, Bloomberg Finance L.P (chart covers period between January 2018 to August 2022)
Marginal costs for natural gas and coal includes variable operating and maintenance cost, in addition to the carbon cost associated with both fuels. Levelised cost of electricity of renewables include the discounted lifetime cost of building and operating a generation asset, expressed as a cost per unit of electricity generated

Another important driver of European carbon prices originates from more ambitious carbon emission reduction targets announced by the European Commission[6]. The so-called "Fit for 55" calls for a 55% reduction in carbon emissions by 2030 compared to 1990, and versus a previous reduction target of 40%. This also included plans to widen the coverage of the carbon trading scheme to include the buildings and road transport sectors[7].

[5] Bloomberg Finance LP (June 2022). Dutch are reviving coal power amid Russian gas squeeze
[6] European Commission (July 2021). European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions
[7] European Commission (July 2021). Questions and answers – Emissions Trading – Putting a price on carbon

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# 4 / Carbon market price outlook

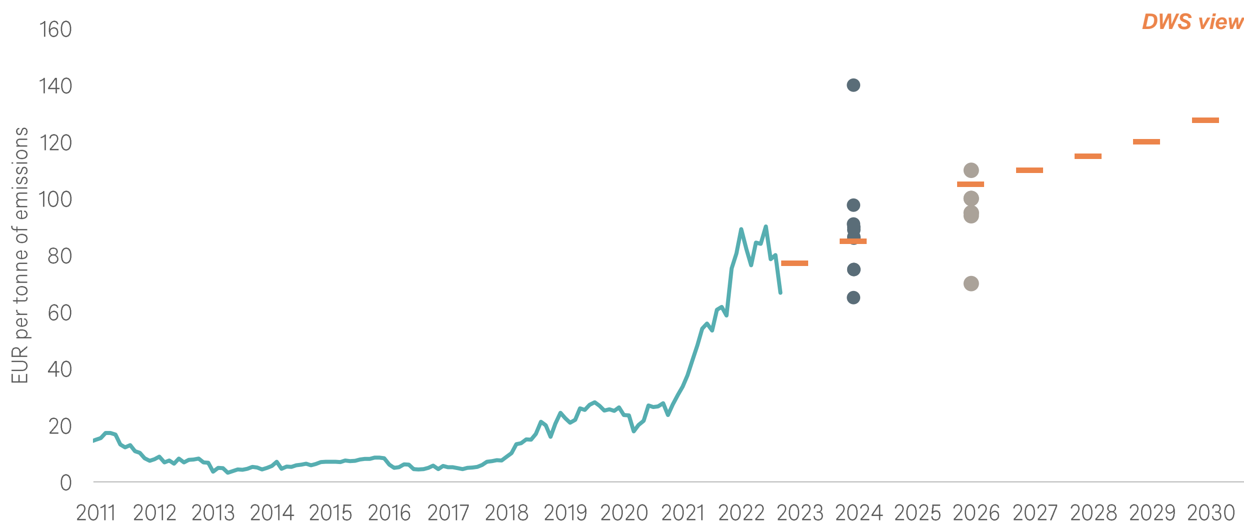
## Beware the consensus view

When it comes to the analyst outlook for the EU carbon price in the coming year and beyond, we find there is a significant divergence of opinion among the commodity analyst community for the year ahead. However, in more distant years, this divergence between the most bullish and most bearish analyst narrows dramatically.

When it comes to the short-term price outlook, this divergence is welcome since one needs to be wary when price forecasts are clustered in a tight range as market prices have a habit of typically frustrating the consensus view. Rather, what exists today, is wide dispersion of views which typically suggests that market positioning is not biased all in one direction. That being said, more worrying is the clustering of the small number of analysts including DWS for the 2030 EU carbon price forecast. Market pricing typically frustrates the consensus view, and in the event of more aggressive climate policies over the coming years, this might suggest that carbon prices are likely to surpass even the most bullish forecasts by the end of this decade.

The other observation from Figure 5 is that there is a decreasing number of analysts making price forecasts beyond the 12-month horizon. We believe this is a reflection of an under-developed market when it comes to long-term price forecasting. We expect this to change over time as the focus and importance of European and global carbon markets grows.

**Figure 5: DWS carbon price forecast vs. the street**




Source: DWS Research Institute, Bloomberg L.P. (September 30, 2022), The range of analyst forecasts are sourced from sell-side research reports

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