# Carbon price risk: The missing piece in your climate risk model

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The threats presented by climate change to people, corporates and investments have become a key aspect of a broader discussion, with many institutions trying to quantify the risk arising from global warming. In its latest climate risk stress test, the ECB estimates that banks could lose at least €70bn in the next three years alone [1]. Investors typically conceive physical risk to be the most significant; however, not only is the ECB putting more and more focus on transitional risk, but in their stress test it was shown to be the most significant risk factor by far, responsible for €53bn of those losses.[2]

A key driver of the high transitional risks in the ECB scenario is often misunderstood and mispriced[3]: Carbon price risk. Indeed, the ECB see an 'immediate and sustained increase in carbon prices' as the main channel to address transitional risks. This paper examines carbon price risk in more detail, explaining how it fits in within other climate risks and what considerations are needed to measure it accurately.

## What are climate risks?

The Task Force on Climate-related Financial Disclosures differentiates between two main categories of climate risk: Physical and transitional risk. [4]

[1] https://www.bankingsupervision.europa.eu/ecb/pub/pdf/annex/ssm.pr220708_annex1.en.pdf
[2] ibid
[3] https://sparkchange.io/not-all-emissions-are-created-equal-how-to-assess-carbon-price-risk-correctly/
[4] https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf

Physical risks are the result of environmental changes due to climate change, such as extreme weather events or a rise in sea levels. Transitional risks result from the political and economic shifts to move towards a low-carbon economy. Physical and transitional risks are analysed independently as they impact companies very differently and are in some ways contrary to each other. While some physical impacts are unavoidable, more successful transitional measures can reduce the long-term physical risks.

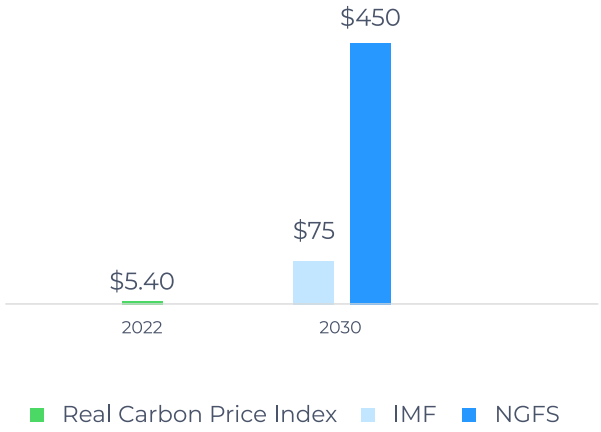
There are numerous frameworks available aiming to quantify climate risk of investments, including MSCI's Climate Value-at-Risk[5], S&P Global's Carbon Earnings at Risk[6] and McKinsey's Planetrics[7]. These frameworks aim to deliver a comprehensive view of the various factors, covering different temperature and policy scenarios to assess the climate risks and resulting opportunities for equities and corporate bonds.

## Carbon Pricing Risk

Carbon price underpins the understanding of transitional risks. It results from governments implementing carbon pricing, such as a carbon tax or an Emission Trading System (ETS) in their jurisdictions, thereby putting a price on emitting $CO_2$. Unlike more chronic physical risks that are expected to transpire at some point in the future, carbon pricing systems have been implemented and are already impacting companies' profitability today.

In October 2022, just below 23% of the world's emissions were covered by carbon pricing[8], at an average price of \$5 /t$CO_2$e. Over the last year, the share of emissions covered has increased by nearly 50%, significantly raising the risk for companies across the world due to carbon pricing.[9]

*Figure 1: Real carbon price (per t$CO_2$e) compared to required price to stay below 1.5 degrees of global warming*




*Source: Real Carbon Price Index, IMF and NGFS*

[5] https://www.msci.com/our-solutions/climate-investing/climate-and-net-zero-solutions/scenario-analysis
[6] https://www.marketplace.spglobal.com/en/datasets/trucost-carbon-earnings-at-risk-(184)
[7] https://www.mckinsey.com/capabilities/sustainability/how-we-help-clients/planetrics
[8] https://www.realcarbonindex.org/indices
[9] ibid

Carbon pricing is often mentioned as one of the main measures to limit global warming, with estimates on the appropriate global carbon price needed to keep global warming to 1.5 degrees ranging from $75[10] to $450[11]. To reach those levels, emissions covered by carbon pricing as well as carbon prices themselves will need to rise substantially, with significant impact on carbon pricing risk on corporates.

## Measuring carbon pricing risk accurately

Most climate risk models do not cover carbon pricing in any detail. Metrics such as carbon footprints multiplied by global carbon prices or WACI miss three key elements of carbon markets that are necessary to correctly account for carbon pricing risk: regional differences, regulation, and companies' mitigating behaviours.

### Regional difference

Carbon prices vary significantly across jurisdictions, from $138.9 /$tCO_2e$ in Uruguay to $0.4 /$tCO_2e$ for companies covered by the Colombian carbon tax to $0 /$tCO_2e$ for most countries of the world[12]. Most climate models use an average global carbon price, which is highly unlikely to be implemented in the future.

This simplification reduces the usefulness of carbon price risk analysis significantly. By way of example, take two companies with the same scope 1 emissions of 1 Mio tonnes, one producing in Brazil with no carbon price, one in the EU with the EUA price for each tonne of scope 1 emissions. A simplified model assuming a global carbon price (i.e. $5 from the Real Carbon Price Index) would calculate the same carbon price risk for both companies. This would significantly overestimate the risk for the Brazilian company, which has 0 carbon costs and underestimate the costs for the European producer, which has total carbon costs of up to $80Mio at current carbon prices (€75 in Nov 2022[13]). Where a corporate's emissions occur is therefore highly relevant to its carbon price risks.

### Regulation

In addition to pricing levels, policy decisions that drive the setup of carbon markets across the world differ, impacting the actual carbon costs companies incur in each market. For example, in the EU ETS, 43% of allowances are allocated for free to heavy industry to allow them to compete with foreign competition that is not paying a carbon price, reducing their compliance costs significantly. This means that despite the current EUA price of €75[14], many big emitter's carbon costs are close to 0. However, the risk of these costs increasing quickly is high, given the EU is planning to reduce those free allocations significantly over the

[10] https://www.imf.org/en/Blogs/Articles/2022/07/21/blog-more-countries-are-pricing-carbon-but-emissions-are-still-too-cheap
[11] https://www.ngfs.net/sites/default/files/medias/documents/ngfs_climate_scenarios_for_central_banks_and_supervisors_.pdf.pdf
[12] https://www.realcarbonindex.org/indices
[13] https://www.theice.com/products/197/EUA-Futures/data?marketId=5474736
[14] ibid

coming years.[15] Therefore, even without a rise in the price of carbon, the carbon price exposure for European industrials will increase notably.

Regulation in carbon markets is in constant change, with political views and ambition changing. In most markets around the world, the ambition to prevent climate change is only increasing as the cost of inaction becomes clearer, making the regulation tighter and increasing the resulting effects on company's balance sheets. One example of proposed regulatory changes is the EU's Fit-for-55 package, which includes the introduction of a Carbon Border Adjustment Mechanism (CBAM). The implementation of CBAM will mean that emissions of any imports into the EU are also covered by the EU ETS, significantly extending the number of companies and emissions subject to carbon pricing risk.

### Mitigation by companies

Faced with these developments, corporates have several options on how to manage carbon costs. The encouraged option is to make their production more efficient, which will reduce their emissions and thereby reduce their exposure to carbon pricing. However, most emission reduction measures within the industry are mid-to long term investments, and will take time to have a meaningful impact on a company's carbon footprint. Future emissions pathways are therefore a critical input into a meaningful carbon price exposure metric.

The mid-term option to reduce the negative effect of carbon pricing on a business is to actively manage the carbon costs, which - if done well - can put corporates in a good competitive position. For example, several large European industrial players have publicly announced that they have banked (i.e. not sold) their over-allocation of free allowances from past years or bought at relatively cheap prices before 2018. This means they are now fully covered with carbon allowances through 2030 and therefore are not exposed to any rise in carbon prices.

The short-term option to manage carbon cost is to pass the cost on along in the supply chain where companies have the pricing power to do so. Overall, rising carbon prices are negative for diversified portfolios because most companies cannot pass on the cost of rising carbon prices in full to their underlying clients and consumers, but some companies can actually benefit. This is particularly common in the power sector, where the wholesale power price across Europe always has a carbon price component. This carbon cost is paid to every power producer, therefore increasing the revenue from carbon free power (i.e. renewables or nuclear). Due to the pass-through along the supply chain, all corporates that use power from the grid are exposed to an increase of the carbon price component in the power price. Corporates' scope 2 emissions are therefore also relevant to their carbon price risk.

The pass-through of carbon costs can benefit carbon efficient corporates, and understanding pass-through capability at a sector, regional and company level is critical to accurately measuring carbon price risk.

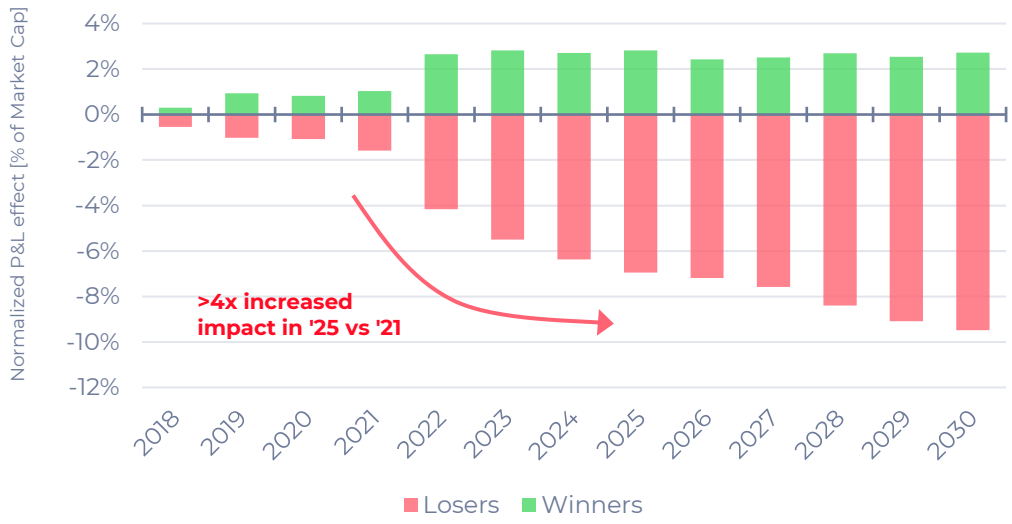
[15] https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/

## Carbon price risks are set to increase over the next years

SparkChange has developed a carbon price exposure metric that encompasses all the factors driving carbon price exposure discussed above. It is focused on the emissions in regions covered by carbon pricing, includes the regulation and future policy scenario for each region, and takes into account the mitigation behaviours of corporates.

This provides a more accurate picture of the future carbon pricing risk of corporates. With global ambition to fight climate change picking up speed, carbon price risk is expected to increase significantly over the next year. Within the EU ETS alone, carbon price exposure for the negatively exposed corporates is expected to increase fourfold over the next 5 years.[16]

*Figure 2: Total CarbonAlpha Effect normalized by Market Cap*




*Source: SparkChange*

The tangible carbon price risk currently comes from existing carbon pricing mechanisms, such as the EU ETS or Canada's carbon taxes. To reach the climate goal of the Paris Agreement to stay below 1.5 degrees, emitting $CO_2$ must become a lot more expensive across the world, and many more jurisdictions will need to price carbon. This will make carbon pricing one of the key transitional risks. A meaningful metric of carbon pricing risk and its sensitivities to different policy scenarios is therefore a crucial element of any climate risk modelling.

[16] https://sparkchange.io/not-all-emissions-are-created-equal-how-to-assess-carbon-price-risk-correctly/

## Contact Us

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