The Frontier Line

Decarbonisation in portfolio construction

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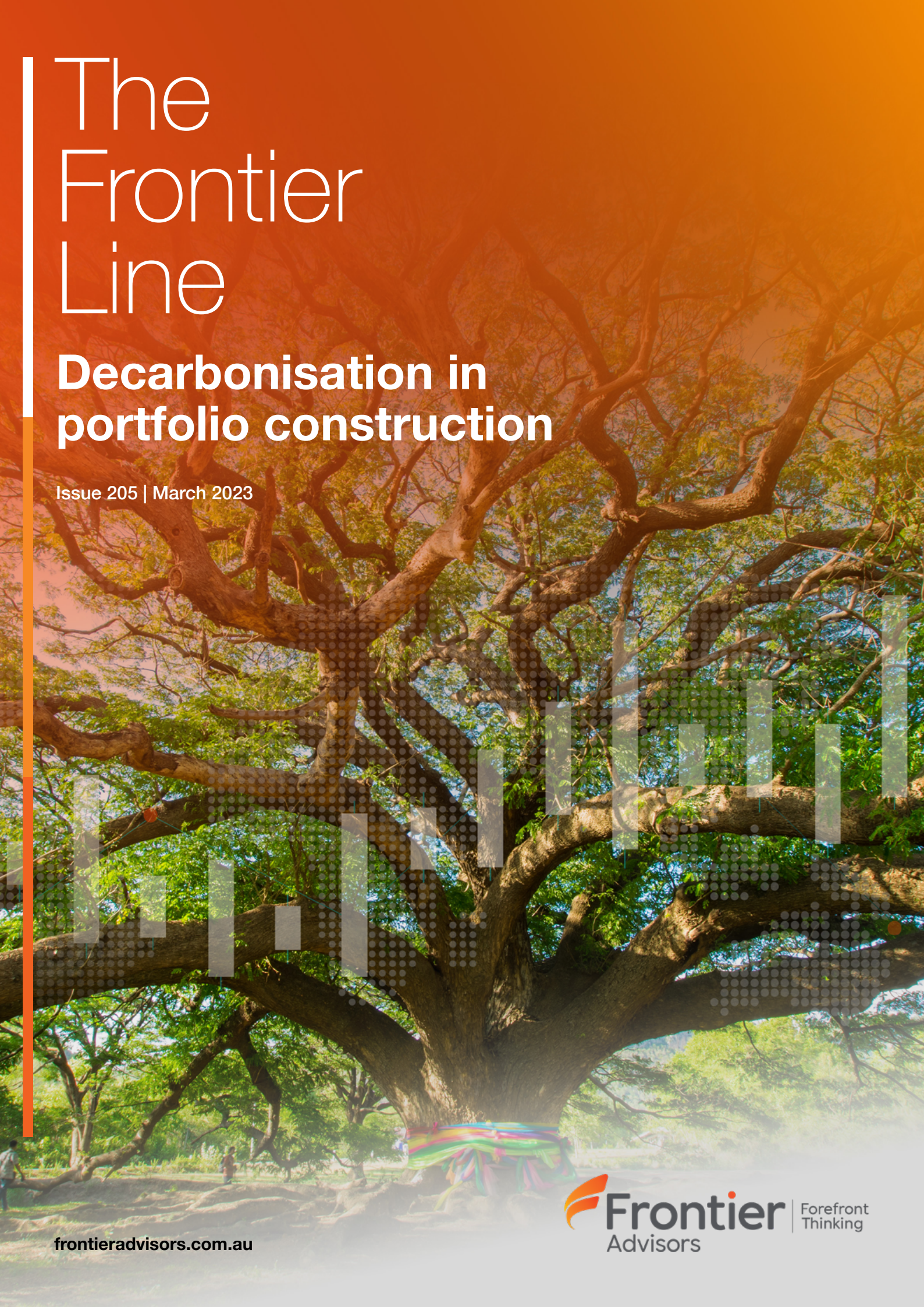

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About us

Frontier Advisors has been at the forefront of institutional investment advice in Australia for over 25 years and provides advice on around $600 billion of assets across the superannuation, charity, public sector, insurance and university sectors.

Our purpose is to empower our clients to advance prosperity for their beneficiaries through knowledge sharing, customisation, technology solutions and an alignment and focus unconstrained by product or manager conflict.

Donna Davis

Consultant

Donna Davis joined Frontier Advisors as an Associate in 2019 before being promoted to Consultant in 2021. She works with the Capital Markets and Asset Allocation team, working on portfolio construction and asset class research. She has a special interest in data analysis techniques, machine learning and their applications in portfolio construction, sensitivity analysis and climate modelling. She also works with the Alternatives and Derivatives team leading research into Insurance Linked Securities.

Prior to joining Frontier, Donna worked for AustralianSuper in their Options Management Team. She also has 9 years banking experience with the Commonwealth Bank and ANZ in Corporate and Commercial Lending. Donna holds a Bachelor of Quantitative Finance from the University of South Australia and is a CFA charter holder.

Viola Miao

Junior Quantitative Analyst

Viola Miao joined Frontier Advisors in October 2022 as a PhD intern of the Capital Market Asset Allocation Team and in March 2023 was promoted to Junior Quantitative Analyst. Her role covers portfolio construction and macroeconomic research, as well as providing ad hoc support for internal and external requests.

Viola is pursuing a PhD in finance in Monash University, and her research interest includes financial forecast, institutional ownership, merger and acquisitions, ESG investments, and corporate finance. Viola completed Bachelor of Banking and Finance, Bachelor of Commerce (Honours in Finance), and Master of Commerce (research in Finance) in Monash University. She has completed Level one of the CFA program.

Introduction

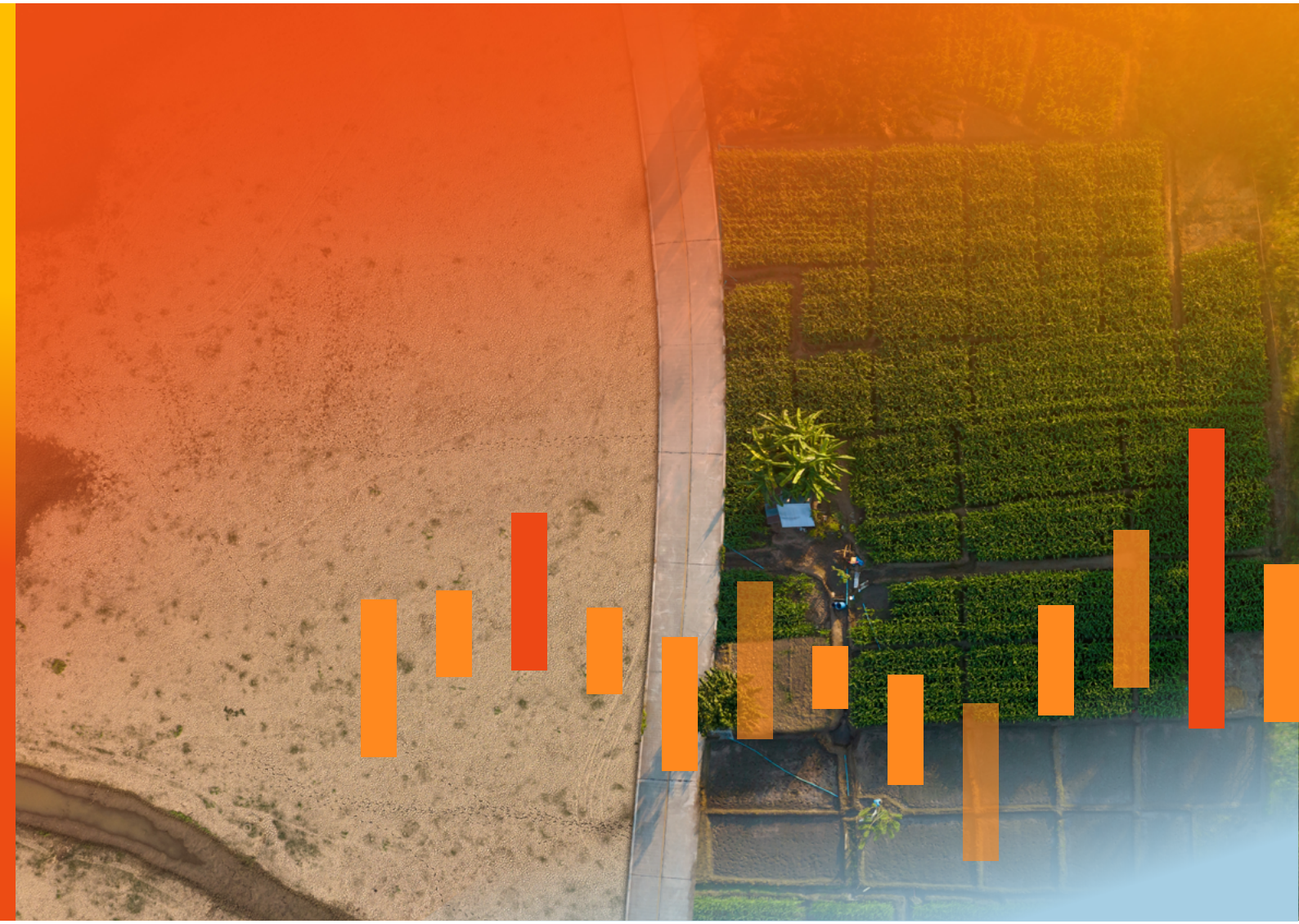
"Not everything that is faced can be changed, but nothing can be changed until it is faced."

– James Baldwin

Awareness of climate change and integrating implications of it into the investment decision-making process is an ever-evolving discussion gaining in momentum. As scientific research and understanding develops, so does the implications and impacts for asset owners and investors globally.

There are multiple approaches to implementing climate aware decisions within the investment process and the outcomes of these different approaches can have a myriad of impacts.

In this paper we explore the implications of reducing carbon exposure within a portfolio, the direct and indirect impacts of these investment decisions and what this can mean for portfolio construction.



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Decarbonisation

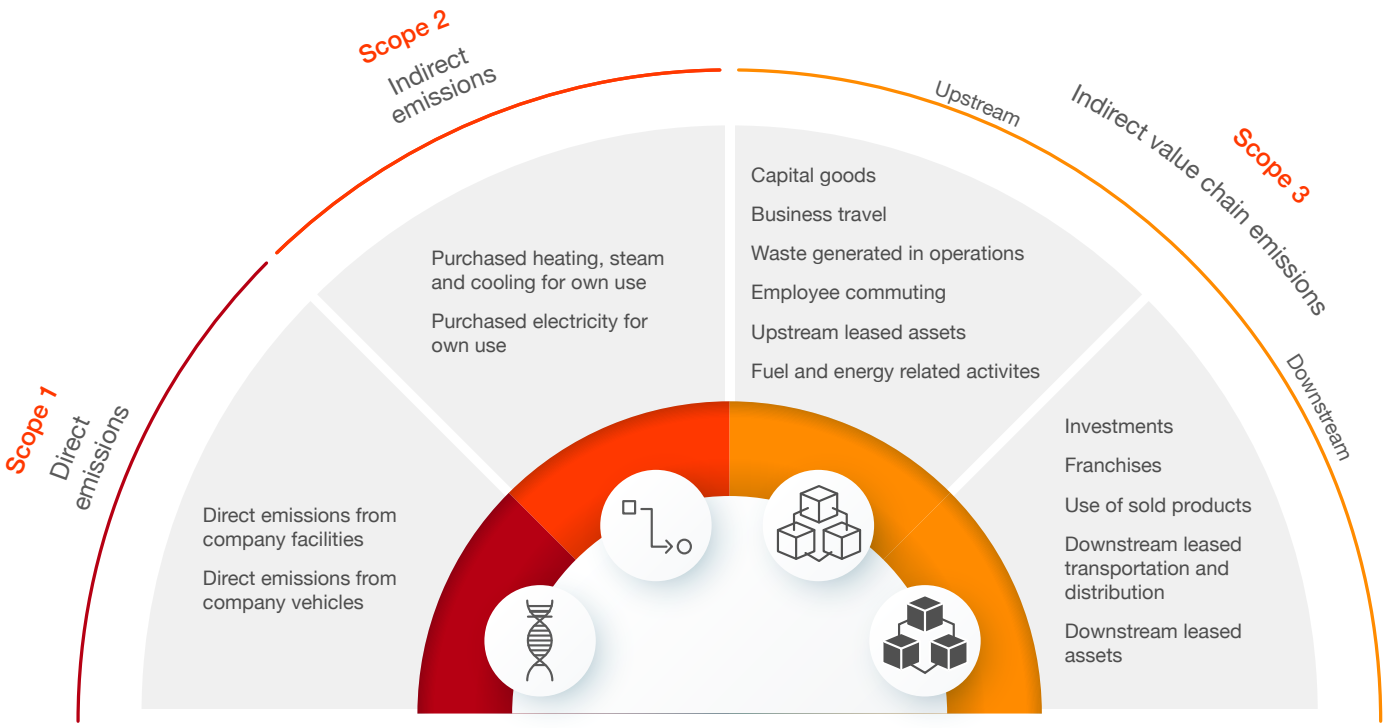
Reducing carbon exposure in equity portfolios is a complex and multi-faceted process with many elements to consider. This includes the types of carbon emissions, business activities, stages of products, and so on. In general, decarbonisation of an equity portfolio tends to include reduction to both carbon emissions (carbon footprint) and carbon reserves (stranded assets), which are highly concentrated in three sectors: energy, utilities and materials.

Understanding the types of carbon emissions is essential when selecting low-carbon investments. Carbon emissions are classified depending on the source of those emissions and fall into three categories called 'scopes'. Scope 1 and 2 emissions refer to activities from the reporting company, whereas scope 3 emissions refer to activities within the value chain but outside of the reporting company. Chart 1 shows the definition of different scope emissions.

The level of carbon emission reductions is related to which scopes are included, together with balancing the expectations of the risk and return of the underlying portfolio.

Our research for Australian equity markets (AEQ) used a proxy which mainly focused on scope 1 and 2 emissions. For our research on international equities (IEQ), we selected two proxy indices to reflect how diverse decarbonisation approaches can be. One proxy, similar to AEQ, covered scopes 1 and 2. The second proxy covers scope 3 emissions as well, indicating a more constrained selection criteria used by a portfolio.

Chart 1: Scope 1, 2, 3 emissions



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Data providers tend to use three main approaches to construct low-carbon indices. We have seen these approaches used in a number of equity portfolios, especially passive low-carbon equity portfolios. These approaches are:

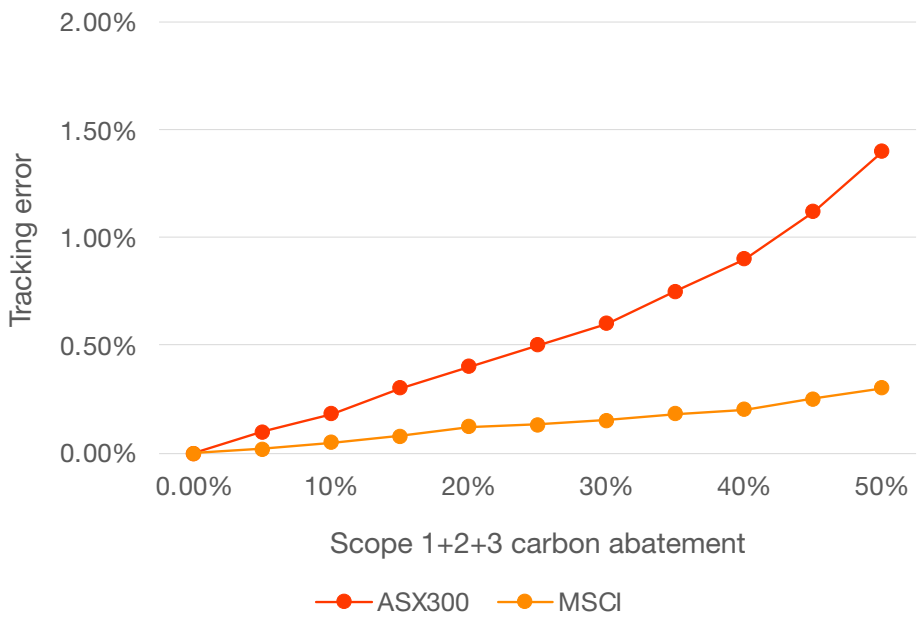
- Approach 1: Excluding high carbon emission stocks.
- Approach 2: Broad-based portfolio approach – using 'carbon weight adjustment' method to adjust stock weights within each industry.
- Approach 3: Narrow-based sector weight approaches – adjusting stock weights across different sectors by unconstrained or constrained weighting methods.

No matter which approach is used, a trade-off or balance will need to be struck between carbon reduction and tracking error. Investors choosing to pursue a larger carbon reduction of their portfolios will need to be aware of the associated high tracking error. Vice versa, actively managed portfolios with higher tracking error may indirectly result in a portfolio with lower carbon exposure.

Our research highlights that global equity indices targeting a greater degree of carbon reduction and alignment with the Paris Agreement objectives show a number of trends linked to factor, sector and country weight selection.

Chart 2 shows beyond a certain point of carbon reduction, tracking error increases at a much higher rate.

Chart 2: Scope 1, 2, 3 carbon abatement versus tracking error



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Research approach

We have selected the ASX 300 Carbon Efficient Index as a proxy for AEQ market, MSCI World Low Carbon Target and MSCI World Climate Paris Aligned for IEQ markets. We found the greater the scope of emissions covered or the higher target carbon reduction, the higher the tracking error of the Index. The proxy selected for our AEQ low-carbon portfolio (ASX 300 carbon efficiency) covers scopes 1 and 2 of the carbon emissions but one of the higher IEQ proxies used in our research (MSCI World Climate Paris Aligned) covered all three scopes. Nevertheless, investors can also focus on scope 3 emissions
for AEQ.

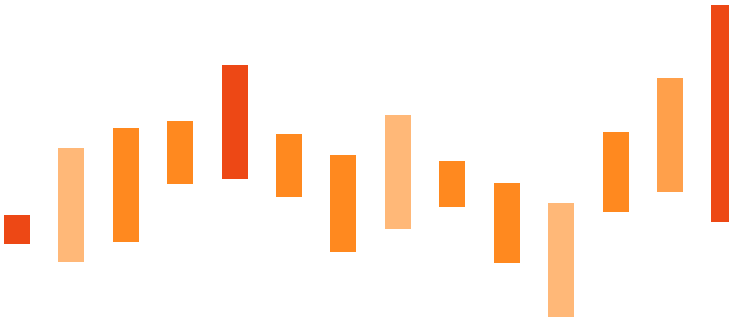
Table 1 presents the comparison of proxy index metrics to parent indices. In general, IEQ markets have a greater degree of diversification than AEQ markets, with adjustments to achieve lower carbon exposure being spread over a greater variety of constituents.

It is important to note the direct association between the tracking error and the scale of weighted average carbon intensity (WACI). Specifically, indices with a larger reduction in WACI tend to be associated with higher tracking error.

The risk and return metrics of low-carbon indices are slightly different to their parent indices over the short-term, but we emphasise the historic track record is short and makes specific conclusions challenging.

Table 1: Comparison of proxy index metrics

		Weighted average carbon intensity (WACI)	Emissions covered	Tracking error
Australian equity index (parent: ASX 300)	ASX 300 Carbon Efficient	-35% to -40%	Scope 1 & 2	< 1%
International equity indices (parent: MSCI World)	MSCI World Low Carbon Target	-25% to -30%	Scope 1 & 2	< 0.5%
	MSCI World Climate Paris Aligned	-50%+	Scope 1, 2 & 3	> 1%



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Breakdown of international low-carbon indices

Chart 3: MSCI World Low Carbon indices factor breakdown

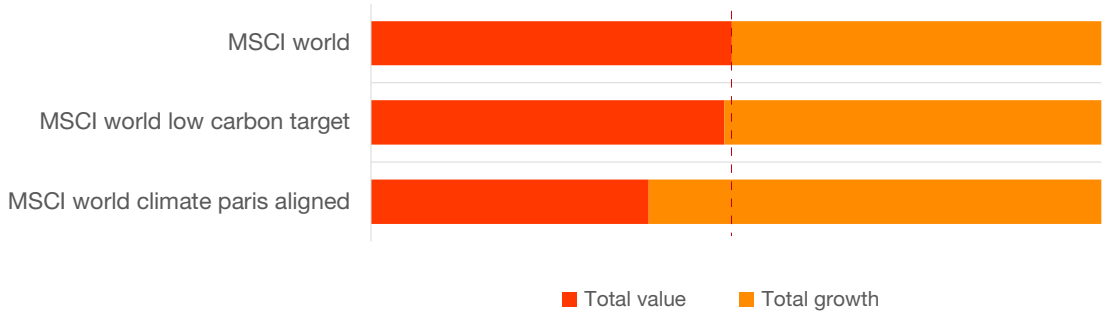


Chart 4: MSCI World Low Carbon indices sector breakdown

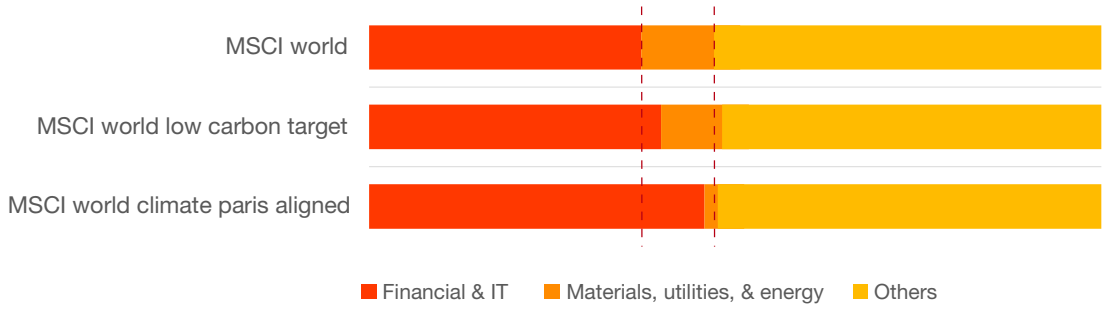
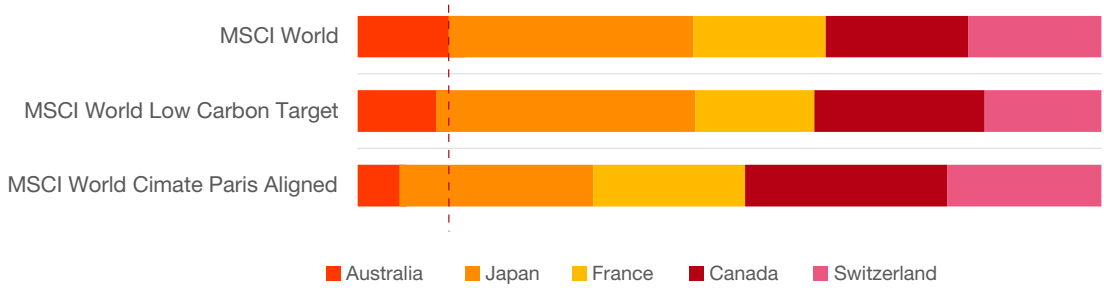


Chart 5: MSCI World Low Carbon indices country breakdown



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Our research then explored the impacts of the different dimensions of carbon emissions, and the resulting impacts on elements such as factor, sector and country tilts.[1] Charts 3, 4, and 5 exhibit the index breakdowns for IEQ markets in terms of factor, sector, and country, respectively.[2] We found that implementing a lower carbon portfolio can result in a portfolio which is more concentrated in growth stocks; financial & IT sectors; and lower Australian equity exposure (for international equity portfolios).

The more constrained indices have sought to reduce exposure to areas deemed to have higher carbon and fossil fuel concentration. This includes reduction of exposure to mining, utilities and energy in favour of sectors such as finance and IT, as indicated in Chart 4. At a country level we see a reduction in exposure to countries with high exposure to these sectors, including AEQ, in favour of countries deemed lower emitters such as Switzerland, as indicated in Chart 5. In some cases this has resulted in a 50%+ reduction in AEQ exposure and results in the index more closely resembling an ex-Aus implementation than the parent.

These implications also highlight potential reversal relationships, which suggest potential implications for broader portfolio construction. A portfolio which holds similar tilts to these factors, sectors or countries has the potential for a greater reduction of carbon emissions, despite this possibly not being the original motivation for these portfolio allocations. Specifically, an investment preference to invest in growth stocks; financial & IT sectors; and non-Australian markets, would indirectly result in a lower carbon portfolio.

Climate change impacts over time

Choosing to reduce carbon in a portfolio does come with an associated cost. Carbon reduction targets and climate aligned goals are aimed at taking on a cost now to reduce and protect against an expected larger cost in the future. When undertaking portfolio modelling, this difference or expected change in asset costs needs to be considered in both a short term and longer term context. The balancing of dual carbon and risk/return objectives can result in choosing to take on that larger expense now so that in the longer term the portfolio is better positioned. The level of the cost now depends on a number of factors including the assets in the portfolio, the location of assets and an investors conviction on how climate change impacts will evolve and how markets respond and price these in.

Tables 2 and 3 present the economic impacts to 2030 and 2060, respectively.[3] Table 3 highlights the main contributor to aggregate climate change ‘costs’ over the short term is mitigation. These are mainly due to businesses and countries ‘self-upgrading’, in preparation for future impacts, for example, the cost of transitioning to renewable energy, cost of reducing carbon in the portfolio, and so on.

Table 3 also shows a ‘reverse’ in what is the main contributor to higher climate change ‘costs’. Over longer horizons, physical impacts/warming/damage increases if less climate action has been undertaken and equates to a much larger portion of aggregate climate impacts. It takes a longer period of time to see the benefits from mitigation action undertaken.

Overall, Table 2 and 3 imply the importance of the time frame being considered for both portfolio construction and potential return impacts when modelling decarbonisation or climate change costs. This again highlights a trade-off decision – between the amount of pre-expense and magnitude of post-benefit and the importance of a dynamic perspective.

[1]Breakdown charts for more international low carbon indices are available with more detailed information.

[2]The chart of country breakdown excludes the proportion of US markets and the markets of the other countries.

[3]The aggregate impact is the sum of mitigation impacts and physical impacts. ‘-’ represents negligible figures. ‘↓’ represents return reduction. The ranges for 1, 2, and 3 arrows are roughly in between of 0-0.2%, 0.2-0.3%, > 0.3%, respectively. “Mitigation impacts” refers to the cost of reducing the greenhouse gas emissions. “Physical impacts” refers to the cost of not reducing the greenhouse gas emissions and subsequent physical implications to the environment.

Table 2: Economic impacts to 2030

Scenarios	Mitigation impacts	Physical impacts	Aggregate impacts
Business as usual	–	↓	↓
Business as usual (extreme temperature)	–	↓↓	↓↓
National determined contributions	↓	↓	↓↓
2C	↓↓	↓	↓↓↓
2C (2030 delay)	↓	↓	↓↓
1.5C (net zero)	↓↓↓	↓	↓↓↓↓

Table 3: Economic impacts to 2060

Scenarios	Mitigation impacts	Physical impacts	Aggregate impacts
Business as usual	–	↓↓	↓↓
Business as usual (extreme temperature)	–	↓↓↓↓	↓↓↓↓
National determined contributions	↓	↓↓	↓↓↓
2C	↓↓	↓	↓↓↓
2C (2030 delay)	↓↓	↓	↓↓↓
1.5C (net zero)	↓↓↓	↓	↓↓↓↓

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Risk and return under climate change

Combining the 'how' of carbon reduction in a portfolio with the 'how long' of different scenario analysis assists in consideration of what the risk and return implications of a lower carbon portfolio can be. While there is broad agreement that all GDP will be negatively impacted by climate change, research and market consensus remain mixed regarding how this translates into return impacts for green and low-carbon assets.

Table 4 summarises potential risk and return outcomes between low-carbon and parent asset classes.

The resulting impact should consider:

- The degree of market incorporation of short and long term climate and carbon costs.
- Impact of running a more constrained portfolio.
- Impact of holding a less risky asset with a lower expected risk premium.

We then combine these expectations with the **known uncertainty** highlighted in our research from the relatively short dated data and literature available and the **unknown uncertainty** from how much we are still unsure about climate change. This uncertainty suggests it is highly likely markets have not priced in all impacts of climate change, with potential for investors to capture these possible opportunities.

Historical benchmark data shows a slight outperformance on average by the low-carbon indices versus the parent. However, the outperformance is not consistent, with several periods showing underperformance and, in some cases, significant under performance by the lower carbon indices. Given historic data is short dated, it is difficult to make any meaningful conclusions.

Overall, risk and return impacts are highly dependent on the time frame being considered. Over the shorter term, markets are more likely to have priced in more of the implications. Longer term, the degree of modelling, scientific and data uncertainty grows, increasing the likelihood that not all elements of climate change impacts have been priced in by markets.

We keep in mind that risk and return impacts are expected to evolve and could change as research, market integration and government responses develop and progress.

Table 4: Supporting arguments of potential risk/return outcomes of low-carbon versus parent asset class

Low-carbon asset	Higher return	Same return	Lower return
Higher risk	Markets not properly priced CC[4], higher risk due to earlier business cycle industries/entities, more potential benefits for green assets.	Insufficient information for a conclusion.	Markets properly priced CC, higher risk due to earlier business cycle industries/ entities, increased demand for green assets raising prices and lowering returns for new investors.
Same risk	Markets not properly priced CC, better placed to benefit from climate transitions.	Insufficient information for a conclusion.	Markets properly priced CC, well diversified indices, increased demand for green assets raising prices and lowering returns for new investors.
Lower risk	Markets not properly priced CC, lower exposure to climate change risks, better placed to benefit from climate transitions.	Markets not properly priced CC, lower exposure to climate change risks.	Markets properly priced CC, lower exposure to climate change risks, lower risk premium.

[4]In this table, "CC" refers to "Climate Change".

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The final word

A big focus by investors in addressing or undertaking climate change action is to reduce carbon exposure within a portfolio. Implementation of this can occur directly or indirectly. This paper offers three main 'trade-off' implications for investors.

First, the trade-off between the level of decarbonisation and tracking error. Portfolios with a greater reduction in carbon emissions tend to have higher tracking error. Vice versa, portfolios with high tracking error have indirectly shown a tendency to have a lower level of carbon emissions, but also dependant on the investor's active preferences.

The second trade-off is between undertaking mitigation action, a cost now, to reduce negative climate impacts in the future. Modelling suggests that to see a large degree of the benefit or offset of these costs can take a number of years. In addition, there continues to be a high degree of uncertainty around the magnitude of these impacts, so considering a range of scenarios can aid in highlighting how much these impacts could differ.

The third trade-off is around how to quantify the resulting impacts. When incorporating the risk and return implications of decarbonisation, both how this has been implemented, how long an investment horizon is and how much has already been incorporated into asset prices should all be considered.

While this paper has focused on the equities asset class, Frontier is expanding this work to cover a broad range of asset classes.

Want to learn more?

If you want to explore the impacts and implications of climate change on your own portfolios, please reach out to our team - we would enjoy the opportunity to discuss this paper with you further.

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