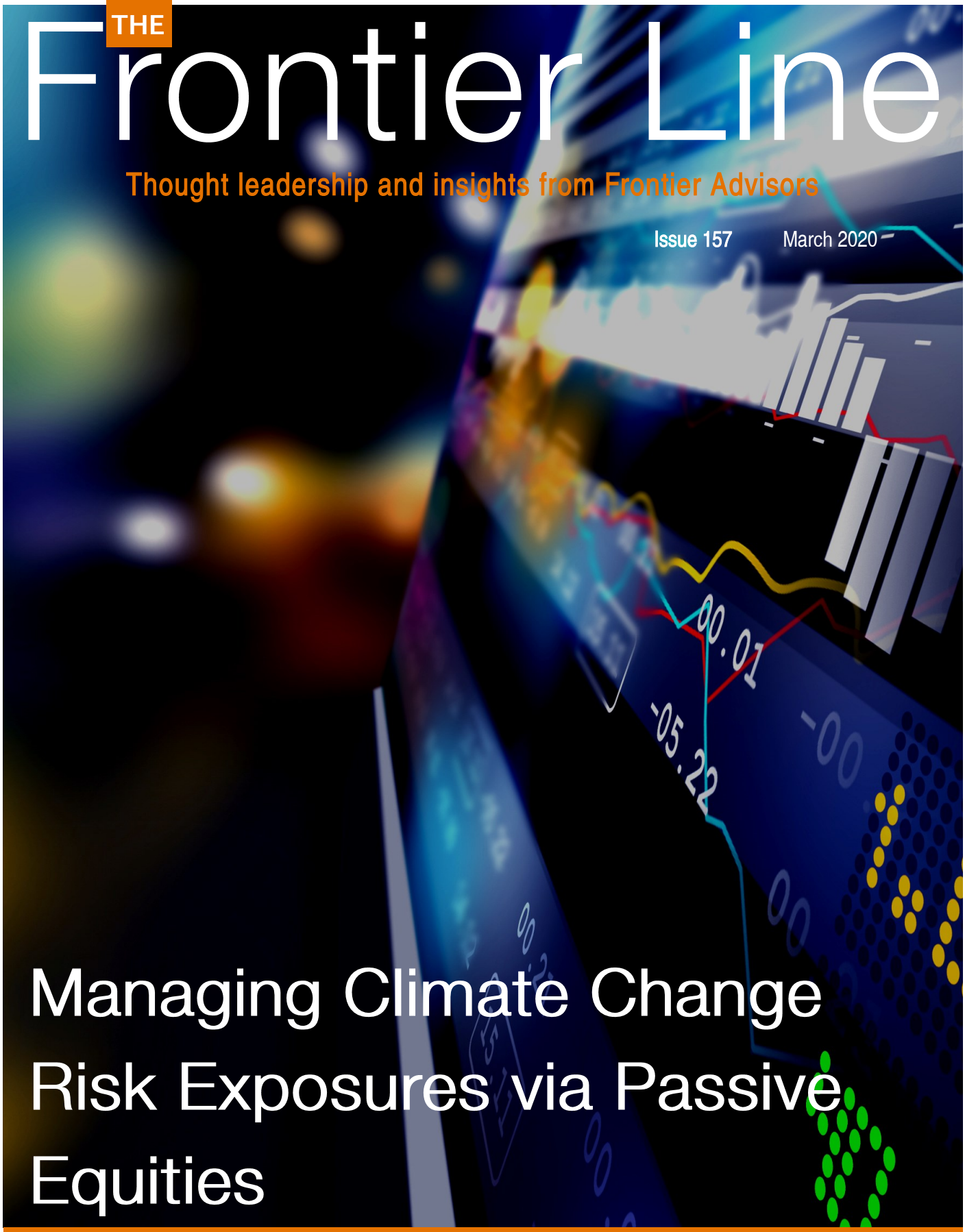
THE Frontier Line

Thought leadership and insights from Frontier Advisors

Issue 157 March 2020



Managing Climate Change Risk Exposures via Passive Equities

FRONTIER ADVISORS

Frontier Advisors

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Frontier's purpose is to enable our clients to generate superior investment and business outcomes through knowledge sharing, customisation, client empowering technology and an alignment and focus unconstrained by product or manager conflict.

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Introduction

For some time now Frontier has accepted the prevailing scientific consensus that anthropogenic climate change is occurring.

Given the systemic nature of climate change, the long-term investment risks and opportunities associated with the ongoing transition to a low carbon global economy are considered material by Frontier. This view is reflected in Frontier's Responsible Investment Beliefs which state that "climate change is a high priority ESG issue facing long-term investors and the effective management of risks and capture of opportunities arising from it will reinforce the sustainability of investment performance".

Most Australian institutional investors share Frontier's high-level investment view on the materiality of climate change based on our observations. As such, these investors already are, or soon will be, seeking to manage their exposure to climate change risks including current and potential future carbon pricing/taxation regimes and "stranded" fossil fuel reserves.

Given listed equities form a significant and liquid allocation in many diversified portfolios, Frontier has observed that institutional investors considering ways to manage climate change risk exposure often start with this asset class, and more specifically, options for passive/index equity allocations. Relative to other asset classes, investors may consider managing climate change risk exposure in listed equities a cheaper and simpler first step.

The purpose of this paper is to explore the potential benefits and limitations associated with indices that aim to manage exposure to climate change risk while offering a similar return profile to conventional market cap weighted indices.

Investors target different objectives driving this focus on climate, the most common being to:

- Mitigate the investment risks associated with these exposures;
- Achieve superior long-term returns as carbon risks are further priced in by markets;
- Better align portfolios with initiatives such as the UN Paris Agreement or Sustainable Development Goals; and/or
- Satisfy stakeholder demand for lower carbon portfolios.

Market for climate-aligned indices

There has been a wide range of carbon-managed indices produced by numerous index providers ranging from the main index providers (e.g. MSCI and S&P) to banks (e.g. HSBC and UBS), to specialist index providers like Engaged Tracking (ET). These indices vary widely by methodology, tracking error to a parent index, carbon metrics used and objectives (e.g. fossil fuel reserves reduction, carbon footprint/intensity reduction, positive impact, etc.). They all adjust stock weights based on a measurable expression of constituent company exposures to climate change risk and share an objective to deliver a portfolio outcome that is superior to a traditional parent index with respect to climate impact. For the purposes of this paper, we have classified this heterogenous set of indices as "climate-aligned" indices.

Although the market for climate-aligned indices continues to proliferate (e.g. indices that have broader ESG objectives beyond carbon targets), this paper focuses predominantly on indices that aim to tightly control tracking error relative to a "parent" (i.e. a standard market cap index). This is because maintaining a relatively low tracking error results in a reduced risk of shorter-term variance in performance relative to the parent index, while still bringing the benefit in increased climate-alignment - such indices should reasonably be considered to be the least controversial/challenging for investors taking first steps to decarbonise their equity portfolios from an implementation perspective.

Of these indices, most conform to one of the following high-level methodologies as identified in Figure 1.

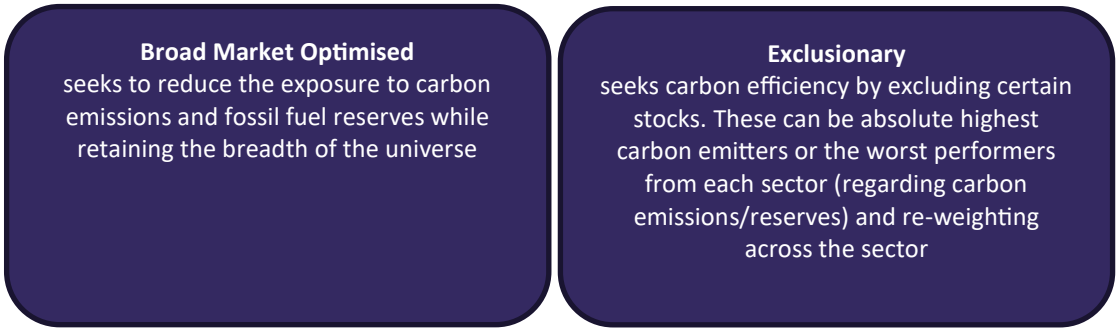
This paper focusses primarily on MSCI global equity indices and Standard & Poor's (S&P) Australian equity indices. MSCI and S&P are well-regarded index providers, whose indices are replicated by index managers and widely used by Frontier's clients to benchmark the performance of their fund managers and sector-level portfolios.

The indices that form the basis of our analytics in this paper are:

- MSCI ACWI Low Carbon Target Index (LC Target Index);
- MSCI ACWI Low Carbon Leaders Index (LC Leaders Index);
- MSCI ACWI ex Fossil Fuels Index (ex-FF Index); and
- S&P/ASX 200 Carbon Price Risk 2030 Adjusted Index (S&P/ASX 200 CPRA Index).

MSCI has developed a family of credible and widely-accepted climate-aligned indices over recent years. At time of writing, S&P, the dominant index provider for Australian equities, while also active in this space, is in a state of transition regarding its Australian climate-aligned indices[1]. Despite the S&P/ASX 200 CPRA Index being a relatively new index (with less than 12 months of live performance data), it seems the most suitable S&P climate-aligned index for our purposes until S&P launches its Carbon Efficient Indices.

Figure 1: High-level methodologies



[1]S&P will soon decommission its S&P/ASX All Australian 50 Carbon Efficient Index (launched in August 2015) and replace it with the S&P/ASX 200 Carbon Efficient Index and S&P/ASX 300 Carbon Efficient Index. The timing of this transition has not yet been confirmed. Given this, S&P's Carbon Efficient indices have been excluded from our analysis.

Climate-aligned index methodologies

As previously noted, climate-aligned indices use different approaches and metrics to manage/reduce carbon footprint/ intensity, carbon price exposure and stranded asset risk. This will introduce a level of tracking error relative to a parent index, which index providers typically seek to minimise. Ultimately therefore, there is a trade-off between minimising tracking error and achieving the primary objective around managing climate change risk.

The consideration of factors – such as implementation fees, licensing costs, and reporting requirements – also naturally influences index selection. The following tables summarise the portfolio construction methodologies utilised for the indices on which we base our analysis.

The differences between the S&P and MSCI indices and the risks they each aim to address, provide investors with a variety of options to suit their individual goals and objectives and are helpful to illustrate the importance of understanding the impact of different implementation approaches.

The S&P and MSCI Indices both utilise internally generated, proprietary climate-related data used to construct their indices. This will naturally lead to the two index providers deriving distinct, and somewhat different, carbon intensity measures if they were to both assess a given company.

[1]S&P will soon decommission its S&P/ASX All Australian 50 Carbon Efficient Index (launched in August 2015) and replace it with the S&P/ASX 200 Carbon Efficient Index and S&P/ASX 300 Carbon Efficient Index. The timing of this transition has not yet been confirmed. Given this, S&P's Carbon Efficient indices have been excluded from our analysis.

Table 1: MSCI Climate-aligned index methodologies

	Global		
	LC Target Index	LC Leaders Index	ex-FF Index
Launch Date	February 2015	September 2014	October 2016
Carbon Emission Objective	Not explicitly stated. Aims to minimise carbon exposure by overweighting companies with low actual[2] and/or potential[3] carbon emissions, then optimising to meet the tracking error target. As at 31 July 2019, the index had reduced its weighted average carbon intensity per US$1 million of company revenue by 69% compared to its parent index.	50% reduction in the carbon emission intensity and potential emissions per dollar of market capitalisation relative to MSCI ACWI. As at 31 July 2019, the index had reduced its weighted average carbon intensity per US$1 million of company revenue by 54% compared to its parent index.	Not explicitly stated. Aims to eliminate exposure to fossil fuel reserves[4] that are used for energy purposes. As at 31 July 2019, the index had reduced its weighted average carbon intensity per US$1 million of company revenue by 14% compared to its parent index.
Tracking Error Objective	0.3% tracking error relative to MSCI ACWI. Ex-post tracking error for the three-years to 31 July 2019 was 0.39%.	Aims to minimise tracking error relative to MSCI ACWI after exclusions are applied. Ex-post tracking error for the three-years to 31 July 2019 was 0.23%.	Target not stated. Ex-post tracking error for the three-years to 31 July 2019 was 0.65%.
Exclusions	After the optimisation process, securities with extremely low weights (less than 10% of the minimum weight in the Parent Indexes) are eliminated.	Excludes top 20% of stocks (by number) with the highest carbon emissions[5]. Companies are then further excluded until the carbon emissions objective is reached.	Companies that have proved and probable fossil fuel reserves[2] used for energy purposes are excluded from the Index.
Carbon Data Source	MSCI ESG CarbonMetrics.	MSCI ESG CarbonMetrics.	MSCI ESG CarbonMetrics.
Target Turnover	<10% at each index review (semi-annual). Index turnover for the 12-months to 31 July 2019 was 13.1%.	<10% at each index review (semi-annual). Index turnover for the 12-months to 31 July 2019 was 9.8%.	Target not stated. Index turnover for the 12-months to 31 July 2019 was 3.3%.
Ideally suited to	Investors whose primary concerns are managing tracking error, while materially reducing carbon emissions and exposure to fossil fuel reserves.	Investors that are attracted to consistent carbon emission reduction and are relatively less concerned about exposure to fossil fuel reserves.	Investors wanting to reduce exposure to carbon emissions and fossil fuel reserves that are willing to take on slightly higher tracking error to meet the objective.

Source: MSCI, Frontier

Table 2: S&P/ASX 200 CPRA index methodology

	Australian
	S&P/ASX 200 CPRA Index
Launch Date	August 2018
Carbon Emission Objective	Not explicitly stated. Aims to account for the potential impact of future carbon prices by reweighting stocks based on the estimated impact on: • A company's operating profit if carbon prices increase to the levels believed to be necessary to restrict global warming to two degrees over pre-industrial averages by 2100; and • A company's subsequent valuation resulting from any estimated loss in operating profits As at 31 July 2019, the index had reduced its weighted average carbon intensity per AUD$1 million of company revenue by 42% compared to its parent index.
Tracking Error Objective	Target not stated. Ex-post tracking error for the 3-years to 31 July 2019 was 0.84%.
Exclusions	No exclusions. All stocks in the S&P/ASX 200 as of the rebalancing date are included in the index.
Carbon Data Source	TruCost (owned by S&P).
Target Turnover	Target not stated. Index turnover for the 12-months to 31 July 2019 was 16.8%.
Ideally Suited to	Investors whose primary concern is the risk associated with a rising carbon price - i.e. index will have higher weight to companies with the ability to pass on the cost of higher carbon prices to the end consumer.

Source: S&P, Frontier

[2]As measured by Scope 1 and Scope 2 emissions as defined in Appendix 1.
[3]As measured by known fossil fuel reserves used for energy purposes.
[4]Being proved and probable coal reserves and/or oil and natural gas reserves.
[5]The cumulative weight of exclusions in a sector cannot exceed 30% of the sector weight in MSCI ACWI.

Composition of climate-aligned indices

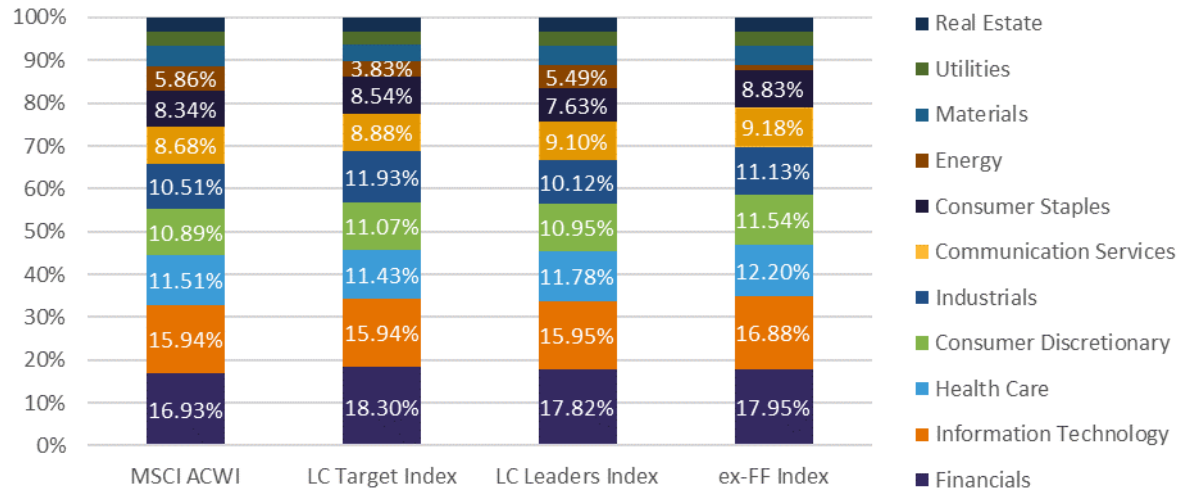
Charts 1 and 2 display the sector and geographic exposures of the MSCI climate-aligned indices versus their parent index (MSCI ACWI).

MSCI's climate-aligned indices display notably limited deviations from the parent index by sector and region despite achieving meaningful carbon reductions. The main exception is the ex-FF Index, which has a materially lower exposure to the Energy sector (1.26% versus 5.71%). This is due to the Index's primary objective to exclude companies that have fossil fuel reserves used in the production of energy.

Chart 3 displays the sector exposures for the S&P/ASX 200 CPRA Index versus its parent index.

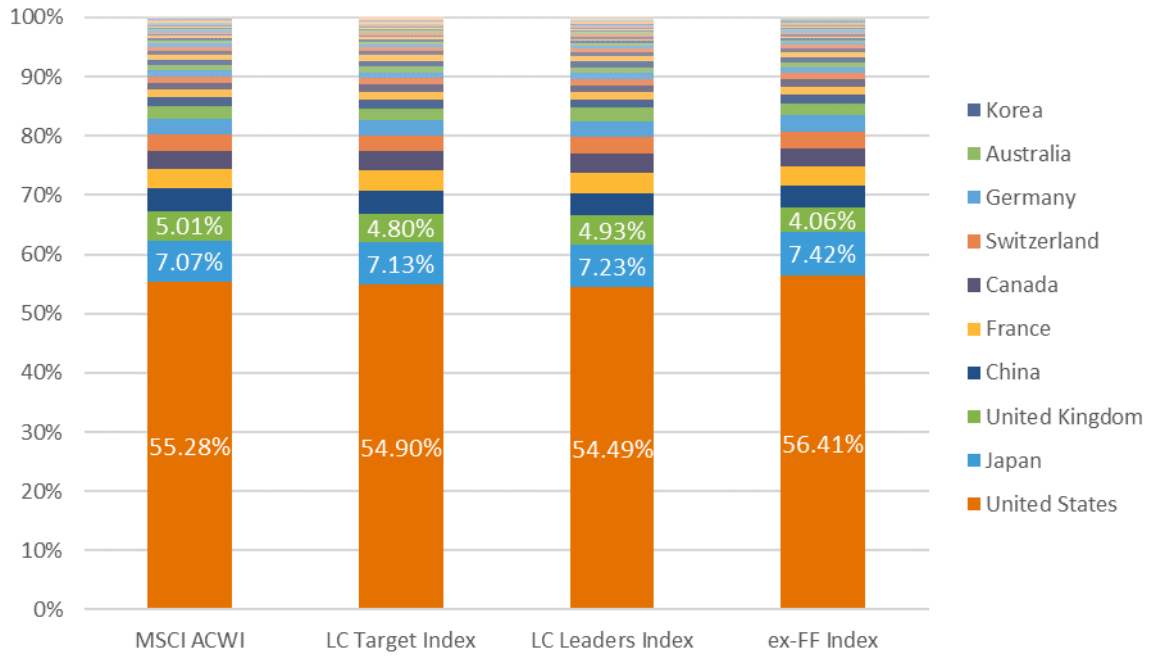
The sectoral deviations between the S&P/ASX 200 CPRA Index and its parent index are also quite limited, although more pronounced than the MSCI global counterparts, reflecting the composition of the Australian market. This is most apparent with respect to a reduced exposure to the Materials (15.9% versus 18.9%), Energy (4.3% versus 5.3%), Utilities (1.2% versus 1.9%) and Industrials (8.1% versus 8.4%), and increased exposure to Financials (35.4% versus 32.0%).

Chart 1: Market cap weighted sector exposures for MSCI climate-aligned indices as at 30 June 2019



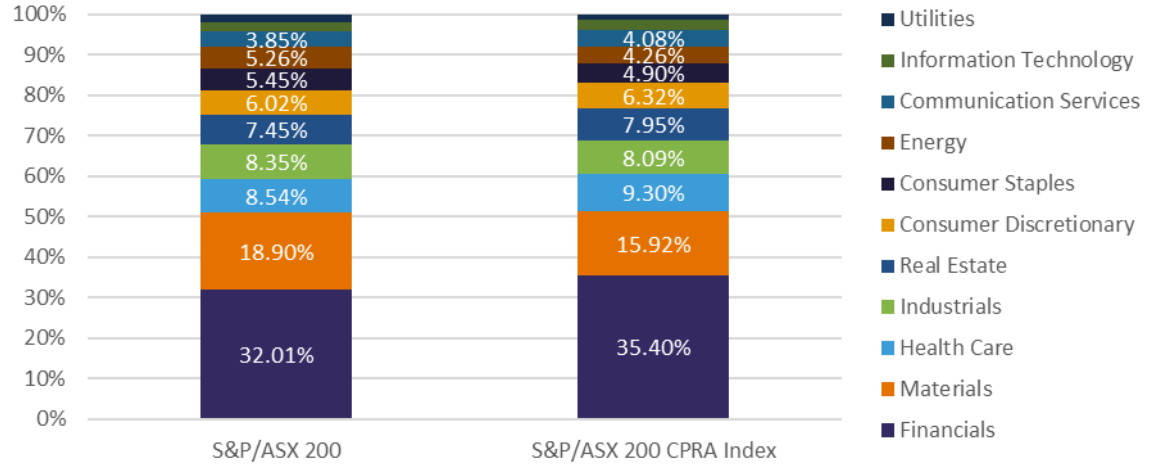
Source: MSCI, Frontier

Chart 2: Market cap weighted geographic exposures for MSCI climate-aligned Indices as at 30 June 2019



Source: MSCI, Frontier

Chart 3: Market cap weighted sector exposures for the S&P/ASX 200 CPRA index as at 30 June 2019



Source: S&P Frontier

Portfolio analysis: return profile

The following table and charts display the return and volatility measures of the climate-aligned indices. Given the difference in methodology, it is not surprising that the MSCI ex-FF Index has a higher tracking error relative to the MSCI LC Leaders and LC Target Indices. The ex-FF Index's stock count is closer to the parent index. However, in the index construction process, the post-exclusion constituents are weighted according to their free float-adjusted market capitalisation, while the LC Leaders and LC Target Indices are optimised to minimise tracking error at the portfolio level. The optimisation technique appears to be highly effective in reducing tracking error relative to the parent index, however, investors must be prepared to have exposure to some holdings that are high emitters or own fossil fuel reserves despite having lower exposure at the aggregate portfolio level. This may occur where these stocks may have been reintroduced or upweighted during the optimisation process.

Despite being the only index reviewed with a specified tracking error constraint, the LC Target Index has struggled to consistently stay within its tracking error limit. Investors should be cognisant that this index may in future have an ex-post tracking error in excess of 0.3% p.a. based on its historical profile.

Similar to the ex-FF Index, the performance profile of the S&P/ASX 200 CPRA Index has consistently deviated more meaningfully from its Parent Index versus the LC Target and LC Leaders indices, resulting in a higher tracking error. This is expected given the concentrated universe of stocks in the Australian equities market. Further, we expect this dynamic to apply to future climate-aligned Australian indices launched by S&P meaning that it is generally more difficult to achieve relative carbon reduction versus a traditional benchmark in Australian equities compared to global equities from a tracking error perspective.

Investors must be aware of the potential for continued meaningful relative performance variance of climate-aligned indices relative to their parent index over short time periods. Each of the indices analysed have performed broadly in line with their parent index over the three-year and since inception timeframes with similar levels of volatility. Looking forward, Frontier's expectation is that climate-aligned indices may moderately outperform their parent index over the long term as the risks associated carbon emissions and fossil fuel reserves become fully priced by the market and society in general.

Table 3: Return and volatility measures for the climate-aligned indices as at 30 June 2019

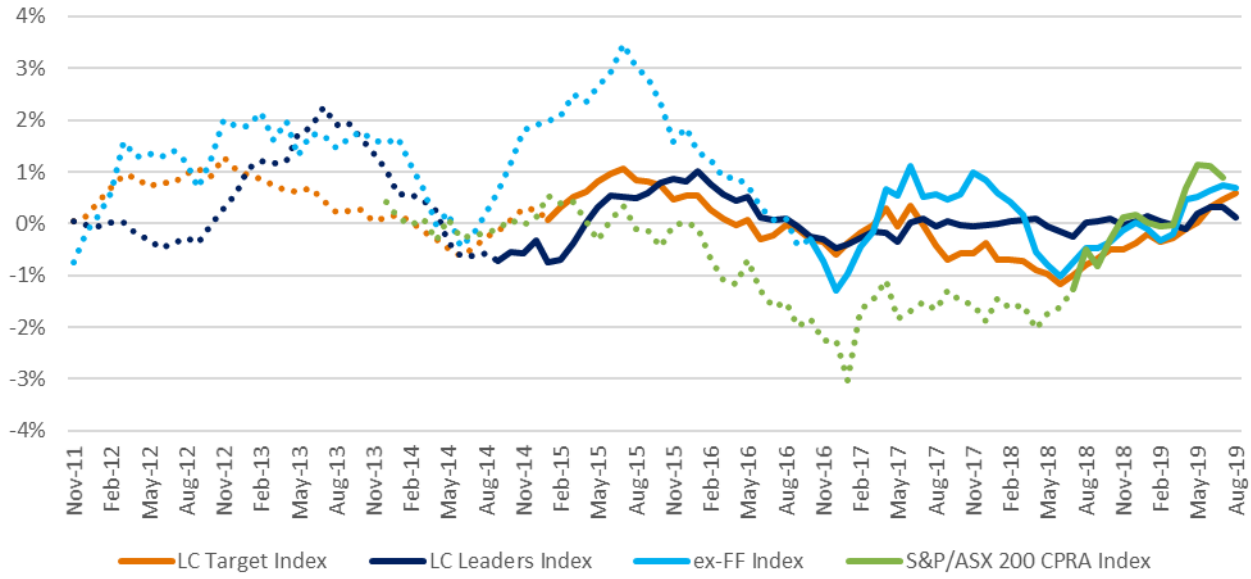
Index	Inception date	Return (% p.a.)		Volatility (% p.a.)	
		3 years	Since Inception	3 years	Since Inception
Global Equities					
MSCI ACWI	-	11.6	-	11.3	-
LC Target Index	Feb 2015	11.5	7.8(7.9[1])	11.4	12.3(12.3[2])
LC Leaders Index	Sep 2014	11.7	6.4(6.2[1])	11.3	12.0(11.9[2])
ex-FF Index	Oct 2016	11.8	10.8(10.6[1])	11.4	11.7(11.6[2])
Australian Equities					
S&P/ASX 200	-	12.9	-	9.2	-
S&P/ASX 200 CPRA Index	Aug 2018	12.2	11.9(11.0[1])	9.2	11.3(11.4[2])

[1] Performance of the parent index since inception of the respective strategy.

[2] Volatility of the parent index since inception of the respective strategy.

Source: MSCI, S&P, Frontier

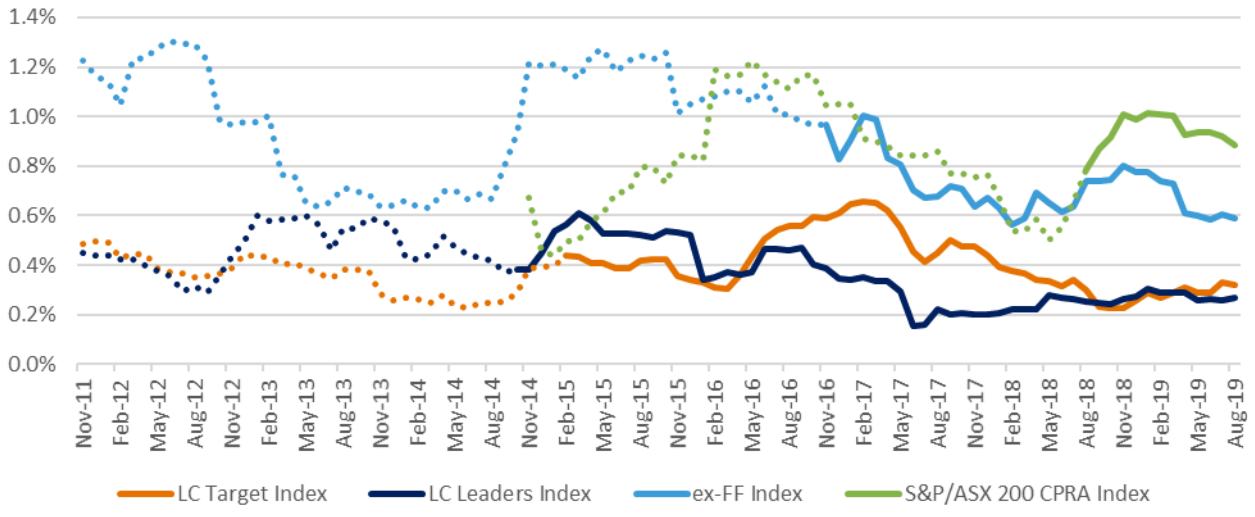
Chart 4: Rolling 12-month excess returns for climate-aligned indices[1]



[1]Chart includes back tested data (dotted-lines) and live data (solid lines).

Source: Bloomberg, Frontier

Chart 5: Rolling 12-month tracking error for the climate-aligned indices[1]



[1]Chart includes back tested data (dotted-lines) and live data (solid lines).

Source: Bloomberg, Frontier

Portfolio analysis: sensitivity to energy prices

Intuitively, energy prices (i.e. the prices of the commodities consumed in energy production) should be an important variable with respect to the performance of climate-aligned indices. Although subject to shorter-term variables like geopolitical tensions, over the long term they can reasonably be considered as a proxy for the degree to which global policy settings are aligning with the transition to a lower carbon economy (i.e. carbon price).

In a scenario where governments make a concerted push to limit global warming to 1.5°C or 2°C above pre-industrial averages, we would expect significant movement away from conventional forms of energy towards renewables coupled with significant improvements in energy efficiency. In this scenario, we would expect fossil fuel prices to fall as the production facilities higher up the cost curve become uneconomical.

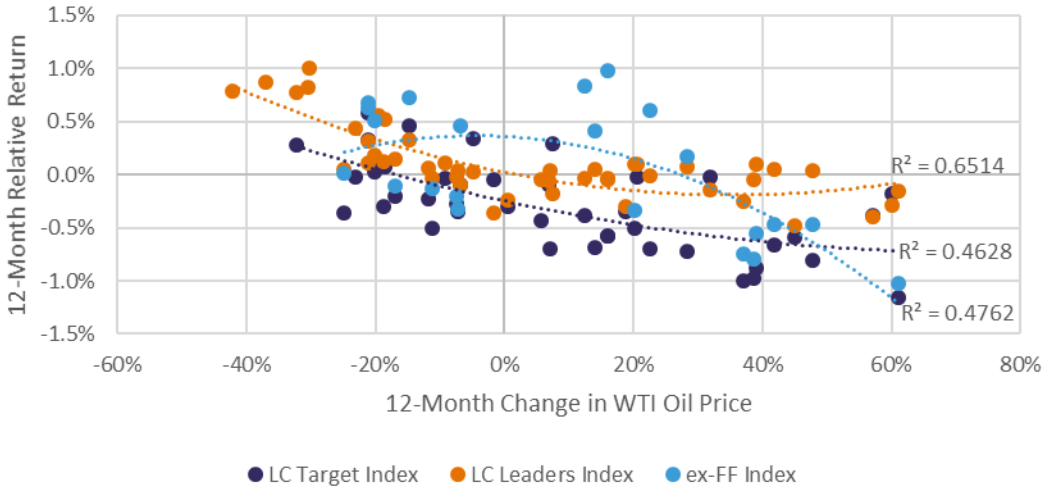
Charts 6 and 7 compare the performance of the climate-aligned indices in rising and falling oil price environments (as being illustrative of energy prices more generally).

As anticipated, movements in the oil price have historically been an influential factor in the performance of climate-aligned indices. Historically, rising oil prices have been a headwind, while falling oil prices have been a tailwind over the shorter term.

Overall, we expect that investors investing in climate-aligned index products will likely experience short-term under/out performance relative to their parent index driven by short-term changes in the oil price. The above analysis also suggests that a concerted global effort to curb global warming could drive positive relative performance for the climate-aligned index products over the long term (albeit constrained by any tracking error limits).

[6]The analysis focusses on oil prices given 1) Unlike coal, there are only two widely accepted oil price benchmarks; 2) Unlike natural gas, oil is not considered a transition fuel; and 3) Unlike prices for carbon emissions implemented in certain countries, oil price is more universal.

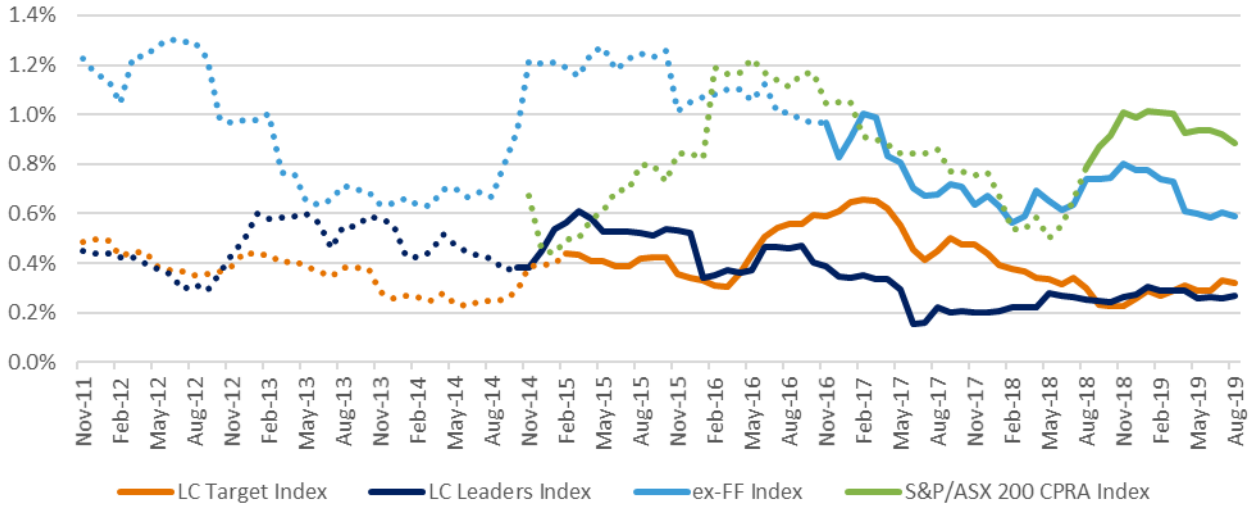
Chart 6: Relative performance of MSCI climate-aligned indices in rising and falling oil price environments[1]



[1] Chart is based on live index data only

Source: Bloomberg, Frontier

Chart 7: Relative performance of the S&P/ASX 200 CPRA index in rising and falling oil price environments[1]



[1] Chart includes back tested data (from August 2016 to July 2018) and live data (from August 2018 to June 2019)

Source: S&P, Frontier

Portfolio analysis: carbon reduction outcomes

Portfolio carbon intensity

There are numerous ways to measure the carbon intensity of a portfolio. The most common approaches are shown in Table 4. The climate-aligned indices have been effective in producing a materially reduced carbon intensity relative to the parent index no matter whether the emissions are measured relative to units of capitalisation or revenues. Relative reductions in carbon intensity range from 14% to 80%. The width of this range reflects the different methodologies and equity market characteristics.

Per unit of revenue/investment, the Australian indices have a significantly greater carbon intensity than the global indices. This is anticipated given Australian indices have a higher exposure to carbon intensive industries.

Despite significant reduction in the carbon intensity of its parent index, the S&P/ASX 200 CPRA Index still has a higher carbon intensity relative to the MSCI ACWI by most measures.

Of the MSCI global climate-aligned indices, the LC Target Index has historically provided the greatest reduction in carbon intensity. It should be noted that the LC Target Index achieved its realised level of carbon intensity to date while having exceeded its tracking error limit by as much as 36 basis points. The ex-FF index provides the smallest carbon reduction, given its primary objective is to reduce exposure specifically to fossil fuel reserves (which do not have high emissions while in the ground), with a lower overall carbon intensity being a secondary (and slighter) benefit.

Table 4: Carbon intensity of the climate-aligned indices as at 31 July 2019

Index	Portfolio Carbon Emissions per $M invested	Portfolio Carbon Intensity[8]	Weighted Average Carbon Intensity[8]
Global Equities (USD)			
MSCI ACWI	139	227	194
LC Target Index	28 (-80%)[1]	49 (-78%)[1]	61 (-69%)[1]
LC Leaders Index	73 (-47%)[1]	114 (-50%)[1]	90 (-54%)[1]
ex-FF Index	112 (-19%)[1]	191 (-16%)[1]	167 (-14%)[1]
Australian Equities (AUD)			
S&P/ASX 200	287	669	582
S&P/ASX 200 CPRA Index	103 (-64%)[1]	257 (-62%)[1]	337 (-42%)[1]

[1]Number in brackets represents percentage reduction relative to parent index

Source: MSCI, S&P, Frontier

[7]AWe distinguish carbon intensity from the more historical "carbon footprint" approach with the latter being a simple metric of total emissions. Carbon intensity expresses emissions as a proportion of a unit of economic activity (e.g. $ millions revenue) and is more useful for portfolio level decision-making.

[8]See Appendix 2 for definitions.

Exposure to fossil fuel reserves

The following figures display the climate-aligned indices' exposures to fossil fuel reserves measured across two metrics:

- Fossil fuel reserves attributable to an investment of US$1 billion; and
- Portfolio exposure to companies that own any fossil fuel reserves.

The LC Target and ex-FF indices have materially lower exposure to fossil fuel reserves across the board relative to MSCI ACWI. The LC Leaders Index also achieves a significant reduction in exposure to thermal coal reserves, but a less substantial reduction in gas (52%) and oil (28%) reserves. The S&P/ASX 200 CPRA Index provides a significant reduction in oil reserves (66%) relative to its parent index, but a lower reduction in thermal coal (38%) and gas (33%) reserves.

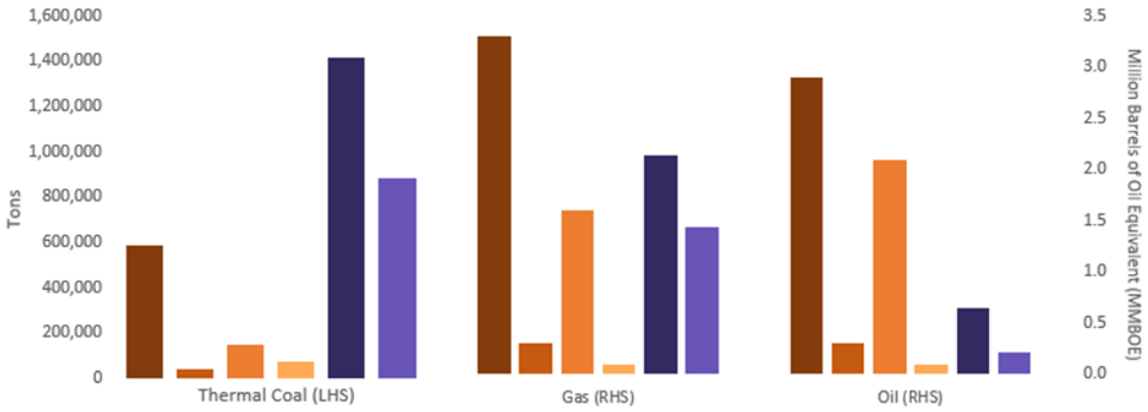
The S&P/ASX 200 Index has significantly higher exposure to thermal coal reserves (~60% more) relative to the MSCI ACWI Index, but lower exposure to oil and gas reserves. Indeed, the S&P/ASX CPRA Index, despite being a significant improvement on its parent index with respect to thermal coal exposure, still has a higher percentage exposure to thermal coal reserves than the MSCI ACWI Index.

Chart 7 provides analysis on how much each climate-aligned index reduces its portfolio exposure (by weight) to companies that directly own fossil fuel reserves. This provides some insight into how efficiently the indices are able to achieve their reduction in exposure to fossil fuels (as per Chart 8) by reducing the portfolio weight in holdings that directly own fossil fuel reserves (i.e. via exclusions or reducing the weight of stocks).

As anticipated, the ex-FF Index achieves the largest reduction in portfolio weight in stocks that own fossil fuel reserves given it excludes companies that own fossil fuel reserves used for energy purposes. The MSCI climate-aligned indices have achieved significant reductions in portfolio exposure to thermal coal reserves (as per Chart 8) while only reducing the portfolio weight in stocks that own thermal coal reserves slightly. Overall, the MSCI climate-aligned indices appear to more efficiently reduce exposure to fossil fuels reserves given the broad stock universe.

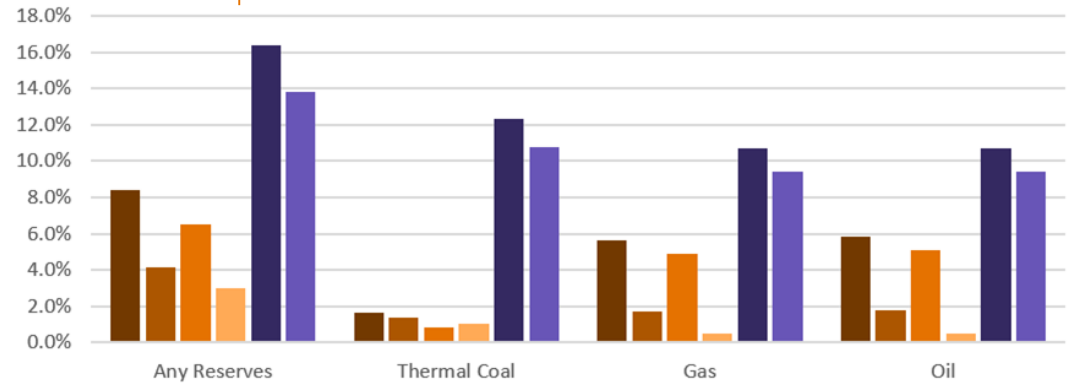
The S&P/ASX 200 CPRA Index does not have a significantly reduced portfolio weight to holdings that own fossil fuel reserves relative to the parent index (~2.5%), yet it achieved a material reduction on average in its exposure to fossil fuel reserves (Chart 8). Like the carbon intensity reduction analysis, it is evident that the Australian equities overall have a higher relative percentage exposure to companies with fossil fuel reserves than global equities.

Chart 8: Fossil fuel reserves attributable to investment of US$1 billion as at 30 June 2019



Source: MSCI, S&P, Frontier

Chart 9: : Portfolio exposure to stocks that own fossil fuel reserves as at 30 June 2019



Source: MSCI, S&P, Frontier

Implications for the portfolio

These findings highlight that there are multiple approaches investors may consider when looking to reduce the carbon emission intensity and exposure to fossil fuel reserves within their equities portfolios. It emphasises the importance of investors having a clear idea of both what objectives they are seeking to achieve and the constraints under which they are investing when determining which climate-aligned index is most suitable.

Assuming the invested dollar value is equal, an investor switching from the S&P/ASX 200 to the S&P/ASX 200 CPRA Index will result in a materially larger reduction in carbon intensity in absolute dollar terms compared to switching from MSCI ACWI to one of the MSCI climate-aligned indices. However, this will also result in an increased tracking error relative to the parent index due to the narrow universe of stocks in the Australian equity market. We note S&P will release a Carbon Efficient 200 and 300 Indices in future. These may prove to be superior alternatives to the S&P/ASX 200 CPRA Index but we foresee similar issues around tracking error if meaningful carbon reduction targets are set.

If an investor's priority when considering a switch to a climate -aligned index is to limit taking on additional tracking error and thereby retain a similar risk/return profile, they could choose to target a similar absolute dollar carbon reduction objective across both Australian and global equities.

This would result in a smaller percentage reduction within Australian equities (e.g. 25%) but result in a more tolerable overall change in tracking error. We also see a case for investors with sufficient scale to consider establishing custom passive mandate to achieve tailored tracking error and carbon optimisation profiles (explored in more detail later).

Beyond the scope of this paper, but perhaps worth noting, is that for an investor with (potentially similar) allocations to both Australian and global equities, an overall reduction in emissions per unit of revenue/capitalisation could also be achieved by reallocating a proportion of the allocation to Australian equities to global equities without necessarily investing in climate-aligned indices. Australian institutional investors often have a significant bias to Australia in their equity portfolio (generally circa 60%) despite Australia constituting only 2% of the MSCI ACWI Index. This bias is primarily due to benefits associated with franking credits, but has not historically considered the elevated climate change risk impact per unit of revenue/investment associated with Australian equities. We suggest that this approach, while positive in that it is simple, is a very blunt strategy which does not consider the relative prospects of each regional portfolio.

Implementation and fees

For Australian asset owners, a key implementation challenge when considering climate-aligned passive applies when the invested capital is less than $100-$150 million. This is due to the limited availability of off-the-shelf Australian-domiciled pooled products available for investment, as this investment theme is arguably not yet fully "normalised" amongst the investment community.

A high-level search by Frontier revealed that there are currently only a few Australian-domiciled pooled vehicles and ETFs managed to track the main climate-aligned indices such as those explored in this paper. These are often custom variants of the main climate-aligned indices specified by the Manager in order to maximise appeal amongst the investor base or those that have originated from specific investor requests.

Examples of these include the:

- SSgA Low Carbon ESG Global Index Trust, which is benchmarked to the MSCI World ex-Australia Select ESG Low Carbon Integrated Index, a custom index SSgA developed in conjunction with MSCI. The fee for this product is 0.24% p.a. with buy/sell spread of 0.10%/0.05%; and
- Van Eck Vectors MSCI International Sustainable Equity ETF, managed to the MSCI World ex-Australia ex-Fossil Fuel Select RSI and Low Carbon Capped Index, which has been developed in conjunction with MSCI. The fee for this product is 0.55% p.a. (buy/sell spread not stated)

The fees for these off-the-shelf products are higher than those associated with an investment replicating the parent index. This is likely to result from the cost of the Manager's IP in creating the custom index.

In the future, we would expect a critical mass of products to be established replicating the off-the-shelf climate-aligned indices, which would be expected to be available at a fee that is in-line with the parent index. We note that pooled investment vehicles will also be subject to a buy-sell spread, while segregated mandates will generally attract higher custody costs.

Given the level of customisation associated with these indices, each should be evaluated on its own merits, particularly with respect to the index methodology and climate-aligned investment risks they are intended to mitigate in order to maximise alignment with the investor's own objectives.

The universe of climate-aligned pooled vehicles and ETFs domiciled offshore is considerably deeper, and this may be a more viable option for smaller clients that are comfortable holding units in foreign domiciled Funds or ETFs. This deeper universe contains products indexed to the main indices discussed throughout this paper.

Implementation is generally not an issue for larger investors that are able to invest sums greater than $100-$150 million, as they can readily appoint the main index managers to establish custom segregated mandates at a management fee of less than 0.1% p.a. for large mandates. Investors with sums of over $150 million to invest, can also:

- Work with index providers to develop custom indices to suit their exact preferences with respect to exclusions, ex-ante tracking error constraints, fossil fuel exposure, etc. The custom indices can also include consideration of broader ESG factors; and/or
- Work with investment managers to develop custom mandates to suit their exact preferences including consideration of broader quantitative ESG factors.

Limitations of climate-aligned indexed equities

Climate-aligned index products typically aim to significantly reduce portfolio carbon footprint/intensity while retaining a low tracking error relative to their parent index. Although this is a desirable result, it is important to consider the current realities and limitations associated with these strategies and methodologies employed. Although the following limitations may continue to pose challenges for investors, these issues have been decreasing over recent years and we expect this trend to continue going forward.

1. **Incomplete reporting of carbon footprint by underlying companies.** Although improving, not all companies explicitly calculate and report their carbon footprint, resulting in index providers having to rely on various assumptions (typically sector-averages), reducing the quality and accuracy of carbon data. Despite the data being imperfect, we believe approaches involving well-reasoned assumptions still offer a reasonable indication of the actual carbon footprint of companies and can therefore be comfortably relied upon by investors, particularly at a portfolio level.

2. **Reporting generally does not include Scope 3 (value chain emissions).** Reported carbon footprint metrics generally only cover Scope 1 (direct emissions)10 and Scope 2 (indirect emissions)10, due to data limitations for Scope 3. This is problematic because emissions along the value chain typically account for more than 75% of a company's total carbon risk exposure.

3. **Retained exposure to stocks with high carbon footprint.** Unless specified, climate-aligned indices will tend to retain exposures to several discrete companies with a high carbon footprint, although these holdings will typically be held at an underweight relative to the parent index. This is in order to limit tracking error to the parent index. For investors seeking full divestment of say, higher emitting utilities, this methodology will not suit.

4. **Narrow market breadth is a limitation to achieving both the climate change objective and maintaining low tracking error.** The ability of climate-aligned indices to meet the dual objectives requires a high degree of breadth in the investment universe. Carbon footprint and carbon reserves are typically highly concentrated in three sectors globally; Energy, Utilities, and Materials. In global equities, achieving carbon reduction objectives typically requires taking underweight positions to these sectors. In a narrow investment universe (e.g. Australia), achieving a similar carbon reduction objective introduces active share risk and elevated tracking error due to the concentration ultimately requiring stock-specific consideration. Therefore, climate-aligned equivalents of parent indices with smaller investment universes will struggle to materially reduce carbon intensity and simultaneously limit tracking error to the same degree as a climate-aligned equivalent of a parent index with a much broader investment universe.

5. **Limited live data.** Given many climate-aligned indices are relatively new, none have live data going back to the Global Financial Crisis (GFC) and as such there is limited insight to be gleaned from how such indices might perform in a deep market crisis.

It should be noted that company reporting on carbon emissions has been improving over time. This is partly due to increased guidelines and frameworks developed by groups like the Task Force on Climate-Related Financial Disclosures (TCFD) and the Sustainability Accounting Standards Board (SASB). As reporting of carbon metrics improves, we expect for example, that index providers will increasingly integrate Scope 3 emissions into their methodology.

Furthermore, carbon reporting has historically been backward-looking and only recently are we seeing heightened emphasis by policymakers on what companies are doing to transition to a lower-carbon economy from a forward-looking perspective. We expect such forward-looking data to increasingly be embedded into climate-aligned indices in the future.

Summary of key considerations

By exploring the nuances of some of the more popular climate-aligned equity indices, we have hopefully shed some light on the key considerations of which investors should be mindful when considering such strategies. We summarise each briefly in the following:

Careful consideration of and clear stakeholder agreement on desired carbon outcomes and other specific objectives: The broader market of climate-aligned indices caters to a diverse investor universe, each with unique preferences regarding climate change risks and opportunities. Each of the indices seeks to meet specific climate change objectives, and therefore have differing tracking error, carbon intensity, fossil fuel exposure and longer-term return profiles. There is no single "best practice" approach and without investing effort to clearly agree their specific climate objectives ahead of time, the asset owner is more likely to experience an extended and/or disrupted search for the right product.

Trade-off between tracking error and climate-aligned objectives: typically, there is a trade-off between tracking error (relative to traditional indices) and the scale of climate-aligned objectives (e.g. a target level of lower carbon intensity). The indices considered in this paper were specifically selected for their relatively low tracking errors, making products managed to them easier for trustees to accept as candidates to replace existing market cap weighted index products (over a long-term horizon). There are also passively-managed products with even higher levels of tracking error in order to target more substantive climate change outcomes, however investors must fully appreciate the implications of switching to one of these from a traditional index product, particularly if the investor's overall equity sector is also benchmarked against a traditional index and/or if they are particularly sensitive to peer risks.

Performance Profile: To date, the live track records of the indices analysed have been broadly in line with their parent indices. That said, shorter-term returns have been susceptible to certain factors such as the oil price (as a proxy for energy prices), where the performance of the climate-aligned indices have out/underperformed by up to 1% for global equities and 2-3% for Australian equities over rolling 12-month periods. On the other hand, as backdrop of global climate policy evolves, the risk of "climate policy shock" (e.g. a ban on petrol/diesel vehicles) impacting financial markets rises and climate-aligned indices are expected to be better positioned relative to traditional indices in such events. As with most equity strategies, Frontier believes the longer-term return profile should be the key focus.

Carbon Intensity and exposure to Fossil Fuel Reserves: The reduction in carbon intensity achieved by the climate-aligned indices relative to their parent indices has been significant but does vary widely, with reductions ranging from 14% to 80%. The exposure to fossil fuel reserves is also reduced significantly ranging from 16% to 64% depending on the index chosen. In keeping with the first dot point above, investors should have a clear view of what reduction level is desired/appropriate for their portfolios.

Asset Allocation approaches (e.g. Australian Equities versus Global Equities): for a given dollar value invested the carbon intensity of the Australian equities index is significantly higher than global equities (more than double). Notably a meaningful reduction in carbon intensity can also be achieved by reducing an investor's relative allocation to Australian index equities in favour of global index equities. However, this is a very blunt strategy which does not consider the relative prospects of each regional portfolio.

Data limitations: Carbon data has improved considerably over the past few years and continues to improve. However, data remains incomplete, particularly with respect to Scope 3 emissions, the forward-looking strategies companies are undertaking to transition to a lower carbon economy and because a meaningful subset of companies are still yet to start reporting their carbon footprint.

Accessibility: Currently the number of available pooled products managed to the main climate-aligned indices remains limited and fees are higher than those associated with replicating the parent index. This poses a challenge for smaller investors seeking to invest in these indices. There are some ETFs available, albeit most of these are listed on overseas stock exchanges, which can be a hurdle for investors that are not comfortable with holding direct foreign listed ETFs. Access for larger clients (investing ~$150 million plus) is relatively straightforward, given they can appoint an index replication manager to manage a segregated mandate to an index of their choice or even collaborate with index providers to design custom indices to suit their exact requirements. Larger clients can also potentially engage with quantitative managers to design a systematically managed custom mandate suited to the client's exact requirements.

The final word and next steps

Frontier views climate change as a high priority responsible investment issue facing long-term investors and that the effective management of risks and capture of opportunities arising from it will reinforce the sustainability of investment performance. We therefore think investors should methodically consider material climate-related factors when developing investment strategy and implementing portfolios.

Practically, addressing climate change in a comprehensive way across large, highly diversified investment portfolios is complex. Frontier's observation is that asset owners have therefore tended to implement solutions at an asset class-level and progressively build a portfolio-wide climate strategy over time. In this endeavour, Frontier recommends climate-aligned passive equity strategies are formally considered by investors as a first step toward implementing a strategy to manage climate factors.

Importantly, Frontier's view is that there is no one "best practice" when implementing climate-aligned passive equities. Individual investors need to (1) clearly articulate and (2) balance their specific objectives and constraints (e.g. a desired level of carbon reduction versus higher fees and/or additional tracking error). Only then can they identify a suitable climate-aligned passive equity strategy to help them achieve their ambitions. Positively, there is a large and growing array of climate-aligned products available, increasing the likelihood that any asset owner will find a strategy that meets their specific needs.

Areas of potential further research include the merits of higher tracking error "passive" strategies and active fundamental and quantitative products as potential alternatives to conventional investment managers. Frontier will also look at the S&P/ASX 200 and 300 Carbon Efficient Indices when released and contrast these with the S&P/ASX 200 CPRA Index.

For practical reasons, a number of considerations have not been explored in depth with respect to managing climate change risks and opportunities within equity portfolios including:

- The degree to which passive managers can engage with companies that have business strategies that are poorly aligned with the transition to a low carbon economy, particularly relative to active managers;
- The degree to which selling down/out of companies with fossil fuel reserves actually addresses the broader level of emissions generated (i.e. are we just transferring the burning to someone else?);
- Broader ESG considerations related to managing climate factors, such as the "just transition" (being the social consequences of transition to a lower carbon economy).

Going forward, Frontier will continue to undertake research on how climate change risks and opportunities can be managed across clients' broader portfolios.

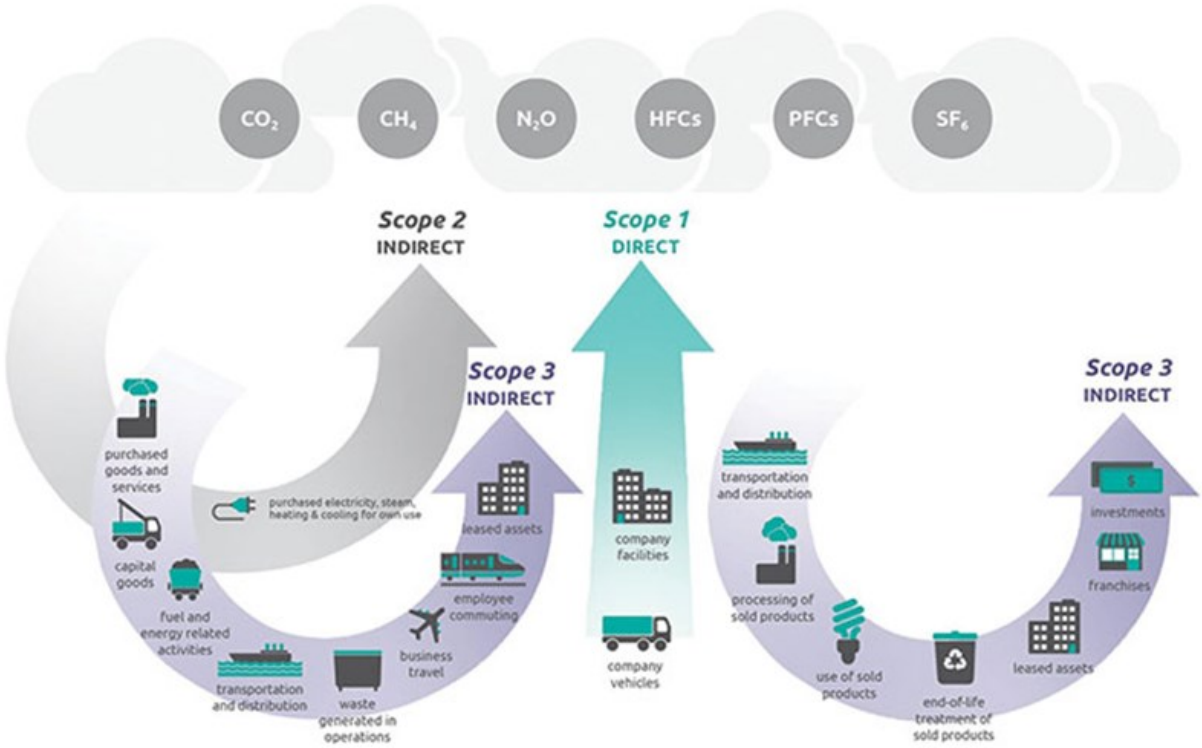
Appendix

Appendix 1: Defining scope 1, 2 and 3 emissions

Scope 1 refers to emissions resulting from sources that are owned or controlled by the company

Scope 2 refers to emissions from the generation of purchased electricity consumed by the company

Scope 3 refers to emissions that occur in the value chain including upstream and downstream emissions. Examples include transportation of purchased products or use of sold products



Appendix

Appendix 2: Defining portfolio carbon exposure measures

Carbon Exposure	Definition
Portfolio Carbon Emissions per $M invested	Carbon emissions normalised for the size of the portfolio tracking the index as measured by: Metric tons CO2e/ 1 million invested
Portfolio Carbon Intensity	Efficiency of a portfolio tracking the index in terms of total carbon emissions divided by total sales as measured by: Metric tons CO2e/ 1 million revenues
Weighted Average Carbon Intensity	Exposure to carbon intensive companies as measured by: Metric tons CO2e/ 1 million revenues

Source: MSCI, S&P, Frontier

Appendix 3: Data availability at 30 June 2019

		Percentage of Securities (%)			Percent of Market Value (%)		
	Total	Reported	Estimated	No Data	Reported	Estimated	No Data
MSCI ACWI	2,844	61.4	37.8	0.8	80.8	18.5	0.7
LC Target Index	1,852	63.6	35.6	0.8	80.5	19.0	0.5
LC Leaders Index	2,176	62.0	37.3	0.7	79.6	19.7	0.7
ex-FF Index	2,692	61.8	37.6	0.7	80.6	18.7	0.7
S&P/ASX 200	200	56.0	43.0	1.0	84.7	13.3	1.9
S&P ASX CPRA Index	178	58.4	41.0	0.6	85.2	13.7	1.0

Source: MSCI

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