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How to Decarbonize Multi-Strategy Equity Portfolios: Practical Considerations

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Executive Summary

To support investors who are considering decarbonizing their equity portfolio, we analyzed the carbon intensity of a multi-strategy equity model portfolio (Model Portfolio), and we believe that there is a simple and practical way to decarbonize. We found that carbon intensity reduction can be achieved via reallocating from market-cap based indices to lower carbon intensity indices within each equity sleeve. For the purpose of illustration, we used low carbon indices to demonstrate. In theory, customized climate solutions can also be used, which could provide further flexibility to help accommodate investors' carbon intensity reduction and other climate objectives. We also discuss whether active investment strategy, engagement and exclusion could play a role to help achieve carbon reduction for the Model Portfolio.

Introduction

In the past few years, we have seen a growing number of Asian investors setting decarbonization targets for their equity portfolios. Some investors are interested in achieving carbon intensity reduction versus their market-cap based policy benchmark, while maintaining the desired broad market exposure. Using a model portfolio to demonstrate, we believe this analysis offers a practical way for investors with climate-related investment goals to potentially reduce the carbon intensity of listed equity portfolios, while at the same time maintaining the overall asset exposure of an investor's investment strategy.

We first review the asset allocation and carbon intensity of a Model Portfolio typical of an Asia Pacific (APAC) domiciled investor. We then briefly explore climate indices, potential carbon reductions that can be achieved versus the traditional market-cap based benchmark, and analyze potential tracking error.

To demonstrate how to target various carbon reduction scenarios for the Model Portfolio, we provide a case study by reallocating the market-cap based index investment to its lower carbon intensity investment within the same equity sleeve. Given most APAC domiciled institutional investors typically would also invest in active strategies in their listed equity mix, we explore briefly how an active strategy can play a role in overall carbon reduction for an investor. We also touch on investee company engagement, which could help drive down carbon intensity of the investment universe over the long term.

Overview of Model Portfolio and Carbon Intensity

Our analysis commences with a comprehensive examination of a baseline model portfolio sample. By leveraging the aggregate equity portfolio data from Broadridge Global Market Intelligence, we constructed a multiple building block model portfolio drawing on the typical external equity allocation employed by APAC investors. The baseline Model Portfolio asset allocation and its carbon intensity metrics are included in Figure 1.

Figure 1
Model Portfolio Asset Allocation and Carbon Intensities

Building Block	Index	Market Classification	Allocation (%)	Carbon Intensity (tCO2e/USD 1 million)
Global Equities	MSCI All Country World	Developed + Emerging Markets	53	122.18
Emerging Market (EM) Equities	MSCI Emerging Market	Emerging Markets	7.5	355.74
Asia Pacific Equities	MSCI AC APAC	Developed + Emerging Markets	12.5	207.58
US Equities	S&P 500	Developed Markets	7.5	96.35
European Equities	MSCI Europe	Developed Markets	3	81.68
Global — Low Vol	MSCI World Min Vol	Developed Markets	1.5	175.83
Global Infrastructure	S&P Global Infrastructure	Developed + Emerging Markets	7.5	728.24
Global REITs	FTSE EPRA/NAREIT Developed	Developed Markets	7.5	79.88
Total	—	—	**100**	—
Weighted Average Carbon Intensity of the Model Portfolio	—	—	—	190.38

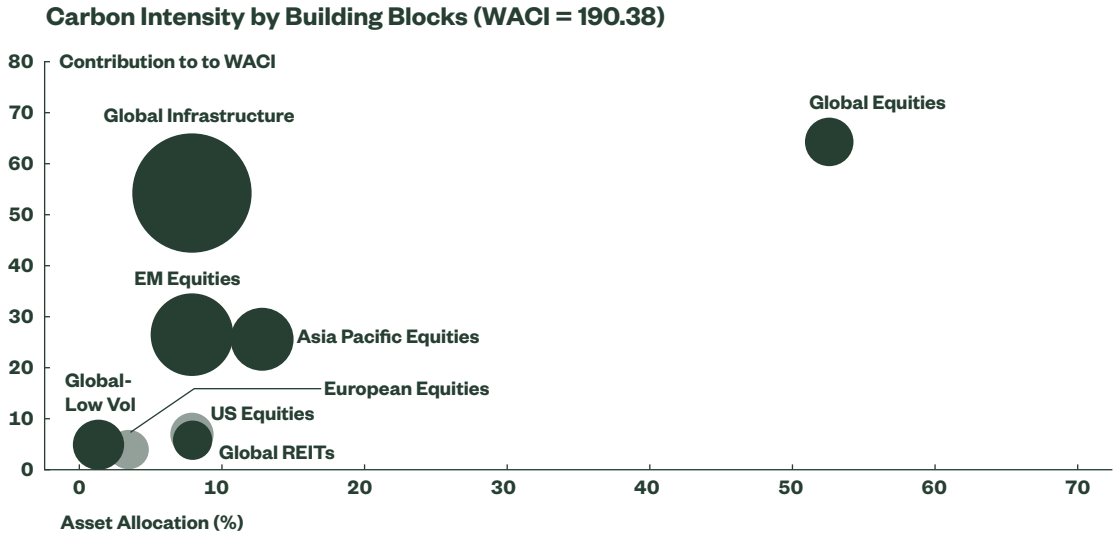
Source: Broadridge Global Market Intelligence, FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

In our experience, many Asian investors use MSCI All Country World (MSCI ACWI), as the standard benchmark for their core global equity portfolio. Additionally, a diversified range of allocations to regional and factor-based exposures is often layered on top of the global equities allocation to allow for a more targeted investment. In replicating this approach, as shown in Figure 1, a significant proportion of the Model Portfolio (53%) is allocated to global equities (MSCI ACWI). A substantial allocation is also dedicated to the regional equities exposure, captured by the Asia Pacific Equities building block under the MSCI All Country APAC (MSCI AC APAC) Index. The Model Portfolio also encompasses a range of diversified exposures that regional asset owners might be interested in, across developed and emerging markets, by regions and by factor styles, as well as listed alternatives, such as global Real Estate Investment Trusts (REITs) and infrastructure. For the simplicity of analysis, we assume that the portfolio fully replicates its underlying benchmark indices in each building block for carbon intensity calculations. For the demonstration in this paper, we assume that the portfolio's policy benchmark is MSCI ACWI.

Figure 1 also includes the carbon intensity of each sleeve. For example, global infrastructure is the highest carbon intensity sleeve with a carbon intensity of 728.4 tCO2e per US$ million revenue, which is more than 100% higher than the second highest carbon intensity sleeve — EM equities.

We also summarize the Model Portfolio asset allocation and carbon intensities in Figure 2.

Figure 2
Model Portfolio Asset Allocation and Carbon Intensities



Source: FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

The bubble in Figure 2 represents each equity sleeve's weighted average carbon intensity (WACI). The vertical axis represents each sleeve's contribution to WACI and the horizontal axis is the asset allocation percentage within the Model Portfolio. The Global Infrastructure sleeve, despite having only a 7.5% allocation within the Model Portfolio, contributes just as much to the Model Portfolio's WACI as the Global Equities sleeve which has a 53% allocation.

To understand the Model Portfolio's relative carbon intensity, we compared carbon intensity with the policy benchmark, i.e. MSCI ACWI. Figure 3 illustrates that the Model Portfolio is 56% more carbon intensive than the benchmark.

Figure 3
Carbon Intensity of the Model Portfolio vs. Benchmark (MSCI ACWI)

Building Block	Carbon Intensity (tCO2e/USD 1 million)	Compare with the Benchmark (% change)
Model Portfolio	190.38	+56
MSCI ACWI	122.18	—

Source: FactSet, MSCI, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

Overview of Climate Index Landscape

We believe a simple and straightforward way to reduce the portfolio-level carbon intensity of the Model Portfolio and maintain the target asset allocation exposure is to reallocate capital from higher carbon intensity indices to lower carbon intensity indices within the same equity building block.To explore this proposition, we first need to understand different types of lower carbon intensity indices available in the market shown in Figure 4.

Figure 4
The Climate Index Landscape

	Climate Risk and Opportunities			Thematic	Alignment	
	Screening/ Exclusions	**Low Carbon**	**Holistic Climate**	**Green Revenues**	**Net Zero (Carbon Only)**	**Net Zero + Holistic Climate**
Primary Goal	Exclude Securities, sectors, industries or other criteria	Reduce Carbon Profile (Intensity)	Integrate multiple climate metrics (Backward and/or Forward-Looking)	Narrow focus targeting green revenues or clean energy sources	Reduce carbon profile along a net-zero pathway May meet minimum standards for PAB/CTB labelling	Integrate multiple climate factors with a net zero pathway May meet the minimum standards for PAB/CTB labelling

Source: State Street Global Advisors. The information contained above is for illustrative purposes only.

As illustrated in Figure 4, the climate landscape can be viewed within six broad climate-theme strategies. Screening/exclusions are the most simple strategies which are designed to exclude exposure to companies involved in Coal and/or other Fossil Fuels. Low Carbon strategies seek to minimize carbon intensity relative to the benchmark and holistic climate strategies incorporate multiple backward and/or forward-looking climate targets. Thematic indices are niche indices which have been designed to target a particular theme, such as Green Revenues.

Lastly, the final group is the alignment indices which have been designed to meet a climate scenario, such as a Net-Zero pathway. The EU Climate Benchmarks, i.e. Paris Aligned Benchmark (PAB) and Climate Transition Benchmark (CTB), are the most common Paris aligned indices in the market. Both PAB and CTB labels are developed following the initial recommendations from the EU Technical Expert Group on sustainable finance (TEG)[1] and are aligned with 'net zero' from a portfolio carbon reduction perspective. Investors who prefer PAB or CTB labelled investments can choose to invest in PAB and CTB indices developed by a range of index providers. We have included examples of different types of climate indices by various index providers in Appendix 1.

In our experience, Low Carbon indices and strategies are commonly used by investors when they seek to minimize carbon intensity. Within the MSCI ACWI universe, a carbon reduction of 40–70% can be achieved with a relatively low tracking error. In Figure 5, we list two commonly used types of lower carbon alternatives of the broad-based market indices in our Model Portfolio: low carbon — which is proxied by using MSCI Low Carbon Target indices; and net zero (carbon only) — which is proxied using MSCI PAB Indices. While MSCI PAB indices can usually achieve higher carbon reduction versus MSCI Low Carbon Target indices, it is also likely to have higher tracking errors as these indices have been designed to exceed the minimum requirements for the EU PAB indices.

Figure 5
Carbon Intensity Comparison of Broad-based Market Indices in the Multi-Strategy Model Portfolio vs. their Lower Carbon Alternatives

Building Block	Parent Index	Index	Carbon Intensity Scope 1+2/ Revenue	% Carbon Intensity Reduction	Tracking Error vs Parent Index (%)
Global Equities	MSCI All Country World	MSCI All Country World	122.18	—	—
		MSCI All Country World Low Carbon Target	49.46	-60	0.50
		MSCI All Country World Climate Paris Aligned	39.32	-68	1.00–1.50
EM Equities	MSCI Emerging Markets	MSCI Emerging Markets	355.74	—	—
		MSCI Emerging Markets Low Carbon Target	161.90	-54	0.50
		MSCI Emerging Markets Climate Paris Aligned	73.48	-79	1.50–2.00
Asia Pacific Equities	MSCI AC Asia Pacific	MSCI AC Asia Pacific	207.58	—	—
		MSCI AC Asia Pacific Low Carbon Target	87.37	-58	0.50
		MSCI AC Asia Pacific Climate Paris Aligned	57.67	-72	1.50–2.00
US Equities	S&P 500	S&P 500	96.35	—	—
		S&P 500 Carbon Efficient	63.75	-34	0.50–1.00
European Equities	MSCI Europe	MSCI Europe	81.68	—	—
		MSCI Europe Low Carbon Target	55.52	-32	0.50
		MSCI Europe Climate Paris Aligned	38.74	-53	2.00–2.50
Global Infrastructure	S&P Global Infrastructure	S&P Global Infrastructure	728.24	—	—
		S&P DJ Brookfield Global Listed Infrastruture Net Zero 2050	322.00	-56	3.00–3.50
Global REITs	FTSE EPRA/ NAREIT Developed	FTSE EPRA/NAREIT Developed	79.88	—	—
Global — Low Volatility	MSCI World	MSCI World Minimum Volatility	175.83	—	—

Source: Broadridge Global Market Intelligence, FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

Although there are some low carbon indices available for the Global Low Volatility sleeve, we have not included these as they have only been recently launched and have a limited track record. Similarly, Global REITs does have a holistic climate index available, but given the REITs industry broadly is less carbon intensive than MSCI ACWI, we have not included the low carbon equivalents.

Additionally as shown in Figure 5, for listed infrastructure, the S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050 Index is used as the lower carbon alternative, as there are very limited options for off-the-shelf low carbon listed infrastructure. It is worth mentioning that DJ Brookfield Global Listed infrastructure and S&P Global Infrastructure Indices are constructed differently based on their respective index methodologies.[2] For investors looking to decarbonize a S&P Global Infrastructure allocation, it might be useful to discuss developing customized low carbon solutions with either index providers, or their external investment managers. For the S&P 500, we chose the Carbon Efficient Index equivalent offered by S&P.

We have used a case study to illustrate how to decarbonize the Model Portfolio by shifting assets to lower carbon alternatives following the order from the highest carbon intensity sleeves to the lowest sleeves. We use MSCI Low Carbon Target indices as the lower carbon alternative across the Model Portfolio, except for the listed infrastructure allocation due to reasons previously discussed.

Case Study: Model Portfolio Decarbonization

To demonstrate how decarbonization can be achieved, we explore potential reallocation from indices in the Model Portfolio to the lower carbon alternative within the same equity sleeve. We have created two sets of scenario analyses with different carbon reduction objectives to walk through the required moves. The shift aims to adjust the existing portfolio without deviating from the intended broad equity sleeve exposures. We focus on steps to minimize the allocation shift impact.

Objective

To minimize weights in the portfolio shifting while achieving the target carbon intensity reduction.

Scenarios Setting

We have set up two different scenarios for the carbon reduction analysis, each with two case studies with different carbon intensity reduction targets. Scenario Set 1 focuses on relative carbon intensity reduction, and Scenario Set 2 focuses on total carbon intensity reduction.

Scenario Set 1

To reduce the excess carbon intensity level over the portfolio's policy benchmark (MSCI ACWI) by (a) 50% and (b) 100% (i.e. so the portfolio's carbon intensity is equivalent to that of the policy benchmark).

Figure 6
Scenario Set 1 Carbon Intensity Target

	Reduction Percentage	Carbon Reduction Needed	Carbon Intensity Target
50% Reduction of Excess	50	34.06	156.24
100% Reduction of Excess	100	68.13	122.18

Source: State Street Global Advisors. The information contained above is for illustrative purposes only.

Scenarios Set 2

To reduce the total carbon intensity level of the Model Portfolio by (a) 30% and (b) 50%.

Figure 7
Scenario Set 2 Carbon Intensity Target

	Reduction Percentage	Carbon Reduction Needed	Carbon Intensity Target
30% Reduction of Total	30	57.09	133.21
50% Reduction of Total	50	95.15	95.15

Source: State Street Global Advisors. The information contained above is for illustrative purposes only.

Analysis

We then follow the below key steps for carbon reduction scenario analysis.

Step 1 For each building block in our Model Portfolio, we identify lower carbon intensity indices that can potentially replace, or partially replace, the current index.

Step 2 We select the desired low carbon indices, MSCI Low Carbon Target indices, given their low tracking error versus the parent benchmark. Our focus is on publicly available low carbon indices in each building block and to strike a balance between achieving meaningful carbon footprint reductions and maintaining representative exposure to the broad market, thereby ensuring minimal deviations from the underlying market indices. Figure 8 includes the carbon intensity of each sleeve and its lower carbon alternative.

Figure 8
Model Portfolio Decarbonization: Carbon Intensity

Building Block	Index	Allocation (%)	Carbon Intensity (tCO2e/USD 1 million)	Lower Carbon Intensity Index	Carbon Intensity (tCO2e/USD 1 million) — Lower Carbon Index	Absolutely Carbon Intensity Reduction	Carbon Reduction %
Global Infrastructure	S&P Global Infrastructure	7.50	728.40	S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050	361.67	-406.24	-55.80
EM Equities	MSCI Emerging Market	7.50	355.74	MSCI Emerging Markets Low Carbon Target	161.90	-193.84	-54.50
Asia Pacific Equities	MSCI AC APAC	12.50	207.58	MSCI AC APAC Low Carbon Target	87.37	-120.21	-57.90
Global Equities	MSCI All Country World	53.00	122.18	MSCI All Country World Low Carbon Target	49.46	-72.72	-59.50
European Equities	MSCI Europe	3.00	81.68	MSCI Europe Low Carbon Target	55.52	-26.16	-32.03
US Equities	S&P 500	7.50	96.35	S&P 500 Carbon Efficient	63.75	-32.66	-33.84
Global — Low Vol*	MSCI World Min Vol	1.50	175.30	—	—	—	—
Global REITs*	FTSE EPRA/ NAREIT Developed	7.50	79.88	—	—	—	—
Total		**100**					

Source: Broadridge Global Market Intelligence, FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue.
* Factor and REITs indices are not included in this analysis for reasons aforementioned. The information contained above is for illustrative purposes only.

Step 3 Starting from the building block with the highest marginal reduction to carbon intensity after switching, we shift the portfolio allocations one-by-one until reaching the target objectives. Shifting the portfolio in this order helps us to minimize the weight changes required for carbon reduction. Based on Figure 8, the switching should start from the Global Infrastructure bucket, which has the highest carbon reduction after switching (406.24), followed by EM equities (193.84), Asia Pacific equities (120.21), Global equities (72.72), US equities (32.66), and European equities (26.16).

Scenario Set 1 (reducing excess carbon intensity) portfolio shift summary

The targeted reductions in excess carbon intensity of the Model Portfolio are feasible and can be achieved with varying degrees of asset reallocation. Specifically, as illustrated in Figure 9, a 50% decrease in excess carbon intensity level can be accomplished with a relatively modest 9.4% weight adjustment, primarily involving the high-carbon intensity Global Infrastructure building block. In contrast, a more ambitious goal of aligning the portfolio's carbon intensity with the policy benchmark level necessitates a more substantial 38.6% asset shift, encompassing adjustments to four building blocks within our Model Portfolio configuration.

Figure 9
Summary of Portfolio Reallocation Shift for Scenario Set 1

Building Block	From	To	Weight Shift % Scenario 1(a): 50% Excess Carbon Intensity Reduction	Weight Shift % Scenario 1(b): 100% Excess Carbon Intensity Reduction
Global Infrastructure	S&P Global Infrastructure	S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050	7.5	7.5
EM Equities	MSCI EM	MSCI Emerging Markets Low Carbon Target	1.9	7.5
Asia Pacific Equities	MSCI Asia Pacific	MSCI AC Asia Pacific Low Carbon Target	—	12.5
Global Equities	MSCI ACWI	MSCI All Country World Low Carbon Target	—	11.1
Total			**9.4**	**38.6**

Source: Broadridge Global Market Intelligence, FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

Model Portfolios after reallocation shifts following Scenario Set 1 are included in Appendix 2 as a reference.

Scenario Set 2 (reducing total carbon intensity) portfolio shift summary

Our analysis (as shown in Figure 10) reveals that achieving a 30% reduction in the total portfolio's carbon intensity level requires the reallocation of 25.1% of the portfolio across three building blocks. Meanwhile, a 50% reduction in total carbon intensity level necessitates a more substantial reallocation of assets, already exceeding 75% of total allocation weights. Model Portfolios after reallocation shifts following Scenario Set 2 are included in Appendix 2 as a reference.

Figure 10
Summary of Portfolio Reallocation Shift for Scenario Set 2

Building Block	From	To	Weight Shift % Scenario 2(a): 30% Total Carbon Intensity Reduction	Weight Shift % Scenario 2(b): 50% total Carbon Intensity Reduction
Global Infrastructure	S&P Global Infrastructure	S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050	7.5	7.5
EM Equities	MSCI EM	MSCI Emerging Markets Low Carbon Target	7.5	7.5
Asia Pacific Equities	MSCI Asia Pacific	MSCI AC Asia Pacific Low Carbon Target	10.1	12.5
Global Equities	MSCI ACWI	MSCI All Country World Low Carbon Target	—	48.3
Total			**25.1**	**75.8**

Source: Broadridge Global Market Intelligence, FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

Using only the previously listed low carbon replacement indices does not lead to a reduction of the total portfolio carbon intensity to a level significantly larger than 50%. Even with the additional switching of US equities (7.5% weight) and European equities (3% weight), the maximum carbon reduction that can be achieved is 53.5% carbon reduction (carbon intensity level after switching is 88.5). Therefore, switching to other lower carbon indices or using other alternative methods are needed to achieve lower carbon intensity target.

For investors who are interested in investing in labelled lower carbon indices, such as Paris Aligned Benchmark (PAB), the same analysis could also be conducted, for example, by using MSCI PAB indices as the lower carbon indices; bearing in mind that it is likely to result in higher tacking error compared with using MSCI Low Carbon Target indices.

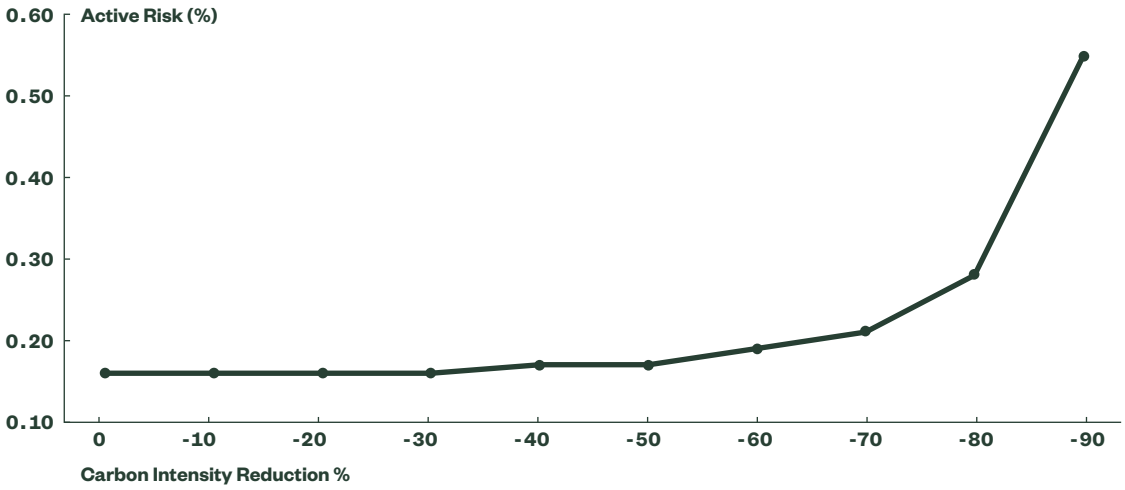
The analysis above shows that carbon reduction of the Model Portfolio can be achieved via switching from the market-cap based index to its lower carbon version. This is a pragmatic way to achieve decarbonization without impacting the current asset allocation of the portfolio. However, this approach does not take into consideration client specific carbon reduction preferences, as well as other climate objectives which can be incorporated by considering customized solutions as discussed below.

Other Considerations

Tailored Solution

For the purpose of demonstration, we used off-the-shelf low carbon indices to demonstrate how to decarbonize the model portfolio. In practice, the solution can be tailored in order to achieve an investor's low carbon reduction target as well as other climate objectives balancing tracking error requirements. For example, in a simple form, a customized solution can be designed to help investors achieve their portfolio decarbonization targets within their risk tolerance, i.e. tracking error budget, using an optimization approach. It is important to note that there is potential trade off between tracking error budget and carbon intensity reduction as shown in Figure 11 below.

Figure 11
Low Carbon Manager Solution
Carbon Reduction vs. Active Risk Tradeoff



Source: Axioma, State Street Global Advisors as at 31 October 2024. The information contained above is for illustrative purposes only. This information should not be considered a recommendation to invest in a particular sector or to buy or sell any security shown. It is not known whether the sectors or securities shown will be profitable in the future.

Figure 11 shows the increase in ex-ante tracking error as we increase the level of carbon intensity reduction. Using MSCI ACWI as the universe, it shows that an optimal level of around 70% carbon reduction can be achieved without a substantial increase of active risk.

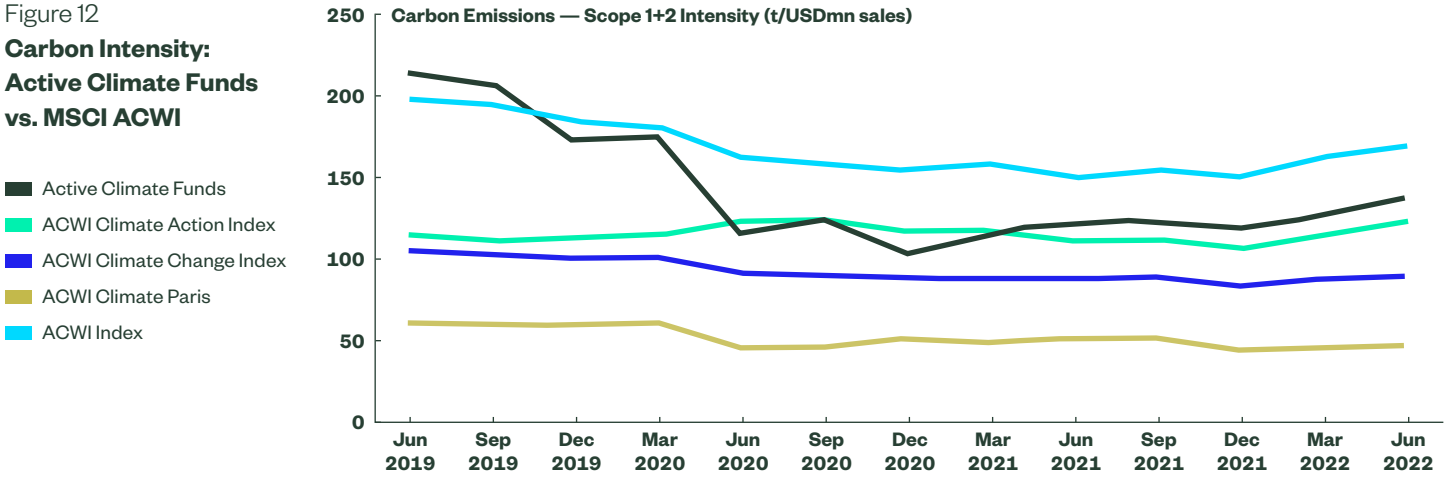
Using a risk-model for optimization not only helps investors balance the trade-off between tracking error budget (risk tolerance) and carbon reduction, but it can also provide investors with more flexibility to achieve portfolio decarbonization targets and target multiple climate objectives such as reducing fossil fuel reserve exposure, increasing allocation to green revenue, as well as incorporating forward looking indicators such as implied temperature rise, climate value at risk and carbon risk rating. We have provided some practical examples to demonstrate how we have helped investors to achieve a range of climate objectives in consideration of their risk budgets in our Climate Files.

Carbon Reduction and Active Strategies

We have illustrated how to decarbonize the Model Portfolio using indices. In practice, most investors in Asia would also typically have an allocation to active strategies in their listed equity portfolios. Depending on the investment style and philosophy of each investment manager, arbitrarily setting a carbon intensity reduction target for an active strategy may add further constraints and limit the active manager's ability to generate alpha. Therefore, as a guiding principle, whether to set a carbon reduction target for an active equity strategy needs to be considered on a case-by-case basis and in consultation with each respective investment manager.

Nevertheless, for actively managed climate funds, empirical evidence shows that these funds tend to have lower carbon intensity compared with market-cap weighted benchmarks as shown in Figure 12.[3]

Figure 12
Carbon Intensity: Active Climate Funds vs. MSCI ACWI



Source: MSCI 2023, 'Parellel Benchmarking for Climate Alignment', p. 2

Figure 12 illustrates that Active Climate Funds have lower carbon intensity compared with the benchmark despite these funds being typically built targeting a diverse range of climate objectives including low carbon intensity reduction and achieving higher green revenues.[4] It is also worth noting that for a broad benchmark such as MSCI ACWI, given the high carbon intensity is concentrated in energy, utility and materials sectors,[5] any active strategy that has an ex-post underweight of these sectors are likely to have lower carbon intensity compared with the market-cap weighted benchmark.

Engagement vs. Exclusions

More broadly, decarbonization of the Model Portfolio can also be achieved by excluding high emitting industries. However, it will likely result in high tracking error versus the unconstrainted benchmark. In addition, divestment/exclusions would have no impact,[6] or very little impact,[7] on the 'cost of capital' of divested companies. Therefore, *Ceteris Paribus*, for investors to achieve real economy decarbonization, negative screening might not be a viable solution; rather investors interested in achieving carbon intensity reduction might want to consider engagement and dialogue with investee companies to discuss opportunities for reducing carbon emissions.

Conclusion

For investors looking to decarbonize their multi-strategy equity portfolio, there are various ways to tackle this problem. Investors have the choice of decarbonizing the portfolio without impacting its asset allocation, as demonstrated by our analysis using the multi-equity strategy model portfolio. Investors can choose to use off-the-shelf indices, or manager solutions, depending on their tracking error budget, investment and climate objectives, and cost considerations. With growing interest from investors on portfolio decarbonization, the investment solutions will continue to evolve to fit the requirements.

Appendix 1

Appendix 1

Examples of Climate Index Series[8]

	Screening/ Exclusions	Low Carbon	Holistic Climate	Thematic	Net Zero (Carbon Only)	Net Zero + Holistic Climate
MSCI	ex Fossil Fuels ex Coal	Low Carbon Target; Low Carbon Target Core; Low Carbon Leaders; Low Carbon Core;	Climate Action	—	CTB Overlay PAB Overlay	Climate Paris Aligned Climate Change
S&P	—	Carbon Efficient	Carbon Budget	Global Clean Energy	—	Climate Transition ESG Paris-Aligned ESG
FTSE	Fossil Fuel Free	—	Transition Pathway Initiative (TPI)	Environmental Opportunities	—	Paris Aligned Climate Transition
Solactive	ex Fossil Fuels ex Coal	ISS ESG Low Carbon	—	—	Climate Transition Paris Aligned	—
Morningstar	—	—	Low Carbon Transition Leaders	—	Climate Transition Paris Aligned	—
Bloomberg	—	—	—	—	—	Climate Transition

Source: State Street Global Advisors. The information contained above is for illustrative purposes only.

Appendix 2

Appendix 2
Model Portfolio After Shifting Per Scenario

Scenario 1(a) Portfolio After Shifting (50% excess carbon intensity reduction)		
Building Block	**%**	**Benchmark**
Global Equities	53.0	MSCI ACWI
EM Equities	5.6	MSCI EM
	1.9	MSCI Emerging Markets Low Carbon Target
Asia Pacific Equities	12.5	MSCI Asia Pacific
Global REITs	7.5	FTSE EPRA/NAREIT Developed USD
Global Infrastructure	7.5	S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050
US Equities	7.5	S&P 500
European Equities	3.0	MSCI Europe
Global — Low Volatility	1.5	MSCI World Min Vol USD

Scenario 1(b) Portfolio After Shifting (100% excess carbon intensity reduction)		
Building Block	**%**	**Benchmark**
Global Equities	41.9	MSCI ACWI
	11.1	MSCI All Country World Low Carbon Target
EM Equities	7.5	MSCI Emerging Markets Low Carbon Target
Asia Pacific Equities	12.5	MSCI AC Asia Pacific Low Carbon Target
Global REITs	7.5	FTSE EPRA/NAREIT Developed USD
Global Infrastructure	7.5	S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050
US Equities	7.5	S&P 500
European Equities	3.0	MSCI Europe
Global — Low Volatility	1.5	MSCI World Min Vol USD

Scenario 2(a) Portfolio After Shifting (30% total carbon intensity reduction)		
Building Block	**%**	**Benchmark**
Global Equities	53.0	MSCI ACWI
EM Equities	7.5	MSCI EM
Asia Pacific Equities	2.4	MSCI Asia Pacific
	10.1	MSCI AC Asia Pacific Low Carbon Target
Global REITs	7.5	FTSE EPRA/NAREIT Developed USD
Global Infrastructure	7.5	S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050
US Equities	7.5	S&P 500
European Equities	3.0	MSCI Europe
Global — Low Volatility	1.5	MSCI World Min Vol USD

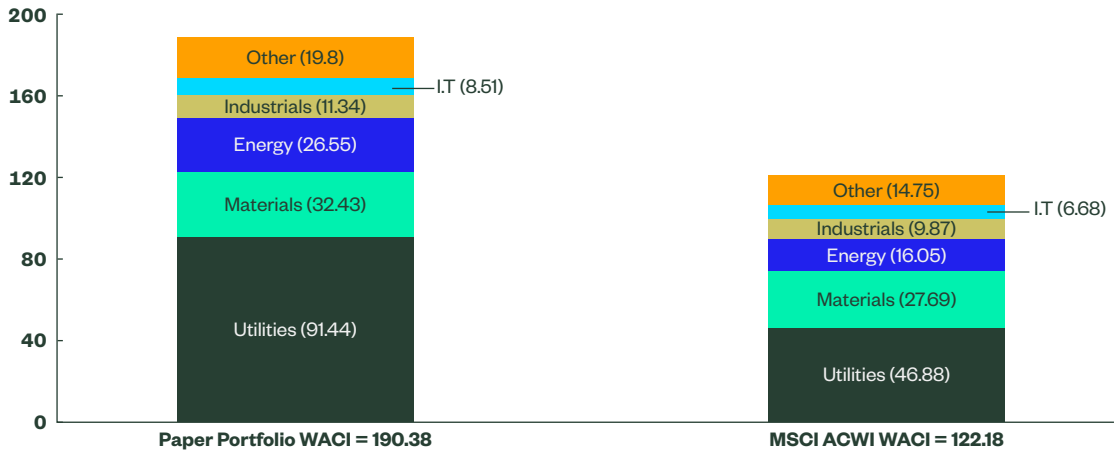
Scenario 2(b) Portfolio After Shifting (50% total carbon intensity reduction)		
Building Block	**%**	**Benchmark**
Global Equities	4.7	MSCI ACWI
	48.3	MSCI All Country World Low Carbon Target
EM Equities	7.5	MSCI Emerging Markets Low Carbon Target
Asia Pacific Equities	12.5	MSCI Asia Pacific
Global REITs	7.5	FTSE EPRA/NAREIT Developed USD
Global Infrastructure	7.5	S&P DJ Brookfield Global Listed Infrastructure Net Zero 2050
US Equities	7.5	S&P 500
European Equities	3.0	MSCI Europe
Global — Low Volatility	1.5	MSCI World Min Vol USD

Source: FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

Appendix 3

Appendix 3

Look-through of Carbon Intensity of Sector Attribution of Multi-strategy Model Portfolio (Original Paper Portfolio) vs. MSCI ACWI



Source: Broadridge Global Market Intelligence, FactSet, MSCI, S&P, FTSE, State Street Global Advisors. Carbon intensity is calculated based on index holdings as at 31 July 2024. Carbon intensity is sourced from MSCI and is defined as Scope 1+ Scope 2 carbon emission normalized by per US$ million revenue. The information contained above is for illustrative purposes only.

Endnotes

1 Further information can be found at: https://finance.ec.europa.eu/sustainable-finance/disclosures/eu-labels-benchmarks-climate-esg-and-benchmarks-esg-disclosures_en.

2 S&P DJ Brookfield Global Listed Infrastructure Index includes companies that are owners and operators of pure-play infrastructure assets. The pure-play infrastructure sectors are airports, toll roads, ports, communications, electricity Transmission & distribution, oil & gas storage & transportation, water and diversified (multiple sectors); S&P Global Infrastructure Index is constructed to include GICS sectors in the following infrastructure clusters: energy, transportation, utilities and telecommunications. Source: S&P Global.

3 Source: MSCI 2023, 'Parallel benchmarking for climate alignment'. MSCI's sample included 23 global climate funds over the study period (July 2019–July 2022).

4 Source: MSCI 2023, 'Parallel benchmarking for climate alignment'. Using MSCI Peer Analytics, funds with the keywords "climate" or "sustainable" as part of their names were selected, and funds with the words "Index", "ETF" or "Indexed" are excluded.

5 Refer to Appendix 3 for a sector attribution carbon intensity of the original Model Portfolio and MSCI ACWI.

6 Gelfand, A. 2021, 'Why divestment doesn't hurt "dirty" companies', available at: https://gsb.stanford.edu/insights/why-divestment-doesnt-hurt-dirty-companies.

7 Kenan Institute of Private Enterprise 2022, 'Getting dirty firms to clean up their act: should you divest or invest?', available at: https://kenaninstitute.unc.edu/kenan-insight/getting-dirty-firms-to-clean-up-their-act-should-you-divest-or-invest/.

8 For a detailed discussion on tracking error differences among PAB and CTB indices provided by different index providers, please refer to SSGA 2024, 'EU Climate Benchmarks: Paris Aligned or Climate Transition'.

About State Street Global Advisors

For over four decades, State Street Global Advisors has served the world's governments, institutions, and financial advisors. With a rigorous, risk-aware approach built on research, analysis, and market-tested experience, and as pioneers in index and ETF investing, we are always inventing new ways to invest. As a result, we have become the world's fourth-largest asset manager* with US $4.72 trillion† under our care.

* Pensions & Investments Research Center, as of December 31, 2023.
†This figure is presented as of December 31, 2024 and includes ETF AUM of $1,577.74 billion USD of which approximately $82.19 billion USD in gold assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated. Please note all AUM is unaudited.