Designing Climate Benchmarks to Produce Positive Outcomes: A Framework for Passive and Active Investors

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Contents

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A collaborative research paper between abrdn's Sustainability Group and Quantitative Investment Strategies

Key takeaways

- Sustainability commitments such as net-zero targets are increasingly driving dual objectives within investment strategies, creating an expectation for managers to balance financial and sustainability objectives.
- Climate benchmarks can play a key role in driving measurable outcomes, but investors must be aware that not all climate benchmarks are created equal and have different outcomes.
- All investors should recognise that the selection and design of a climate benchmark is an active decision regardless of passive or active implementation.

Investors are increasingly integrating sustainability into their investment process. This has supported a growing interest in sustainable benchmarks for both passive and active strategies. The development of climate benchmarks has arguably led the way, driven by investor net-zero commitments, along with regulatory drivers such as the EU standards for Paris-Aligned Benchmarks (PAB) and Climate Transition Benchmark (CTB).

A number of unique challenges are apparent when implementing a climate-themed benchmark compared with a traditional market benchmark – often referred to as a 'parent' benchmark. Even with slight differences in index provider data, such as sector classifications, traditional benchmarks tend to produce very similar outcomes across index providers. However, climate benchmarks have produced heterogenous outcomes, despite often targeting similar climate objectives. This is caused by a number of challenges such as data availability, data consistency, the choice and robustness of methodologies and balancing the relative importance placed on backward-looking and forward-looking data. These challenges pose questions for how investors should approach index selection and design. And they require new solutions from asset managers.

Moreover, sustainability issues are often broad, which means it is commonplace for a sustainability themed benchmark to target multiple objectives. This introduces greater complexity and can result in trade-offs if these objectives are not complementary to one another. In some instances this could lead to unintended consequences for both sustainability and investment outcomes.

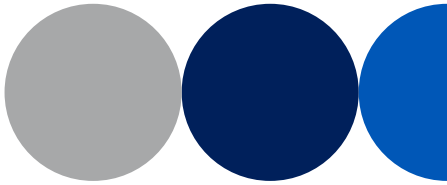
Before investors and asset managers take the steps in selecting and designing an investment strategy or benchmark, it is critical to first recognise that the choice of strategy and subsequent benchmark design is always an active decision. The incorporation of sustainability issues in benchmark selection and design is an additional active step. This is true regardless of whether investment implementation is active or passive.

To tackle the challenges of integrating climate change into benchmark design, investors must clearly define four objectives of the strategy:

- Sustainability objectives
- Return Objectives
- Risk Objectives
- Cost objective

Investors should assess the potential trade-offs across objectives and understand the magnitude of each trade-off. Investors should also be clear on whether the investment objective of the strategy is to deliver a similar risk return profile of the parent benchmark or to capture the risk return of the sustainability theme. This will help determine client appetite for active risk against the parent benchmark. This paper concludes on practical solutions that can be implemented to mitigate unintended consequences, for example, by controlling for multiple carbon metrics, taking a sectoral approach, considering rebalance frequency and taking an active approach to sustainability data.

Benchmark Selection and Design



Purpose of a Benchmark and Relationship to Fiduciary Duty

The way in which a benchmark is used will depend on the identified target market of a fund or the investment mandate outlined by a client. It is often the case that benchmarks are used to proxy the performance of an asset class or an investment style. Therefore, a benchmark is often key for defining the investment universe of an investment strategy.

Passive strategies are typically mandated to track or replicate the performance of a benchmark in a cost-efficient manner. In these cases, the design of a benchmark is synonymous with the design of investment strategy. In contrast, active strategies tend to be mandated to outperform a benchmark through active management, although it is still common for active mandates to include other risk-related objectives relative to the mandated benchmark.

Because of this, the choice of benchmark is often tied to the concept of fiduciary duty. The issue of climate change and fiduciary duty has been discussed at length[1,2]. It is important to recognise that the client is a steward of financial assets, and those assets have a purpose to that client, which may involve sustainability considerations. Because of this, the choice, design, and purpose of a benchmark should go hand-in-hand with the client's investment objectives.

Characteristics of a well-designed benchmark

- **Measurable** – the risk and return should be calculable on a frequent basis.
- **Unambiguous** – the underlying securities and their weights are clearly defined.
- **Transparency** – the benchmark and index rules should be clearly specified in advance to a degree that the implications of the benchmark design are relatively predictable for managers and as such changes in the constituents and their weights can be explained.
- **Investable** – it should be possible to forgo active management and invest passively in the benchmark for ease of replication.
- **Low turnover** – a higher turnover makes replication more difficult as constituents change for passive investors, while for active investors a high turnover means that maintaining relative active weights against a benchmark is more challenging and incurs transaction costs.
- **Reflective** – the intended investment universe is reflected by the benchmark design.

A well-designed benchmark strengthens the accountability placed on an investment manager to deliver on client objectives – whether they be financial or sustainability objectives. In contrast, a poorly designed benchmark can have several adverse consequences, one being ambiguity to what is driving benchmark security weights. This calls into question whether the benchmark rules positively reflect client objectives. Moreover, for passive investors, targeting non-complementary objectives can increase the risk of higher tracking error and higher turnover versus the parent benchmark, as discussed in the Climate Benchmark Challenges section. For active managers, a benchmark that considerably restricts an investment universe, reduces the opportunity set for active managers to produce value-added risk-adjusted returns versus the benchmark. This is particularly adverse if the benchmark design produces an investment universe that does not reflect the intended client objectives.

[1] CCLI-Fiduciary-duties-and-climate-change-in-the-United-States_Summary.pdf (commonwealthclimatelaw.org).

[2] Fiduciary duty in the 21st century final report | Thought leadership | PRI (unpri.org).

Benchmark Selection and Design

Objectives of a Climate Benchmark

There are various types of climate objectives, some may overlap and others may be non-complementary. For example, the net-zero commitments laid out by members of the Net-Zero Asset Owner Alliance (NZAOA), such as targeting emissions reductions of 40-60% by 2030 are accompanied with objectives to allocate capital to climate solutions, set sector decarbonisation trajectories and to pursue climate engagements[3]. This emphasises the need for client objectives to be clearly defined and placed at the centre of benchmark design.

Some investors may also have a focus on the concept of portfolio alignment. There are currently four approaches to portfolio alignment, as outlined by GFANZ[4]. Portfolio alignment overlaps with decarbonisation and climate solution objectives but are more challenging to incorporate into benchmark construction. See table 1, for a non-exhaustive list of potential objectives.

Table 1: Potential Climate Objectives

Objective	Component or Measure of Portfolio Alignment?	Ease of Benchmark Integration	Explanation and Challenges
Decarbonisation Target	Component	Somewhat Simple	Data availability for emissions has improved considerably for Scope 1 & 2, particularly for larger cap developed market indices. However, full disclosure of Scope 3 is very sparse. Moreover, the choice of carbon metric can result in unintended consequences due to volatility in metric components[5].
Climate Solutions Target	Component	Somewhat Simple	Data availability is set to improve due to the development of taxonomies. However, disclosure is lagging emissions disclosure. Climate solutions can be expressed as a percentage of green revenues (backward-looking) or green capex (forward-looking). However, the magnitude of GHG impact is not captured by assessing green revenues/capex.
Portfolio Coverage of Holdings with Net-Zero Targets (Binary Target)	Measure	Somewhat Simple	The number of corporates committing to net-zero has meant data availability has improved. However, the timing, design of targets and methods of reporting targets does vary, even for SBTi targets. Assessing the credibility of targets is also a notable challenge.
Maturity Scale Alignment	Measure	Difficult	This is the alignment approach outlined in the Net-Zero Investment Framework[6]. This approach, requires a significant number of data inputs, often from multiple sources. This can decrease transparency depending on the nature of this data and visibility of look-through to the data and methodology.
Benchmark Divergence	Measure	Difficult	Another measure of portfolio-alignment, at a portfolio-level this requires aggregating the carbon budgets of underlying holdings and assessing their decarbonisation pathways against these budgets. This is methodologically challenging and requires multiple forward-looking assumptions.
Implied Temperature Rise	Measure	Difficult	ITR builds on benchmark divergence by calculating a temperature figure based on overshooting or undershooting the portfolio carbon budget. This improves ease of communication but adds an additional layer of methodological uncertainty and may produce a false sense of certainty.

[3] Target Setting Protocol Third Edition – United Nations Environment – Finance Initiative (unepfi.org).

[4] Measuring Portfolio Alignment (GFANZ).

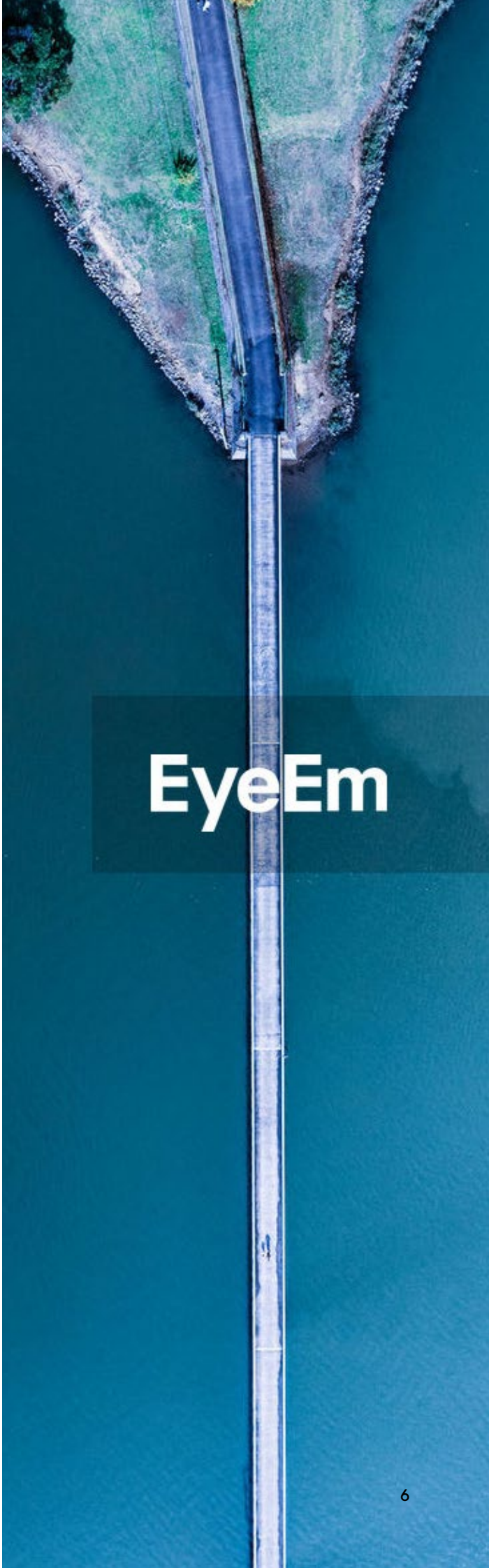
[5] Choosing the right carbon metric | abrdn.

[6] NZIF (IIGCC).

Benchmark Selection and Design

While all the objectives in table 1 are intended to be 'climate positive' they may not all be complementary to one another. For example, this can be the case when implementing a dual objective of decarbonisation and increasing allocations to climate solutions – which may not be low carbon relative to a parent benchmark. Because of the ease of integrating a decarbonisation target it is a commonly applied objective – such as in the EU CTB and PAB. However, it is important to consider that although the intention of this objective is climate positive, it can lead to unintended consequences when inappropriately implemented, such as, creating unintended sector biases.

In the next section we explore some of these challenges in more detail. Reflecting on why, in practice, these objectives can lead to unintended outcomes. Following this overview, we cover the EU climate benchmarks in more detail and then conclude on practical solutions asset managers can apply in order to achieve investor objectives.



Climate Benchmark Challenges

Traditional Market Benchmarks Do Not Perfectly Reflect the Real Economy

The composition of parent benchmarks is an important consideration when integrating climate objectives. Traditional market-cap weighted benchmarks often have sector weightings that are not reflective of the global economy. This is important since the basis of climate objectives like a decarbonisation target are often reflective of the global economy. In some instances, this can lead to a very narrow investment universe, for example, the FTSE 100 has an energy sector bias with a weighting of 12.81% but with a very high stock concentration with only two companies making up the energy sector[7]. In this case, a decarbonisation target, exclusions or tilts will have a material impact across climate and financial metrics. Therefore, investors should be keenly aware of the potential impact of any constraints that will result in material active weights in single stocks or sectors.

This poses challenges to both active and passive investors. For passive investors who wish to match the risk and return profile of a parent benchmark there will be concerns about tracking error and turnover costs. While for active investors a climate benchmark which excessively restricts their investment universe could hinder the opportunity set to produce outperformance, particularly if being compared to the parent benchmark.

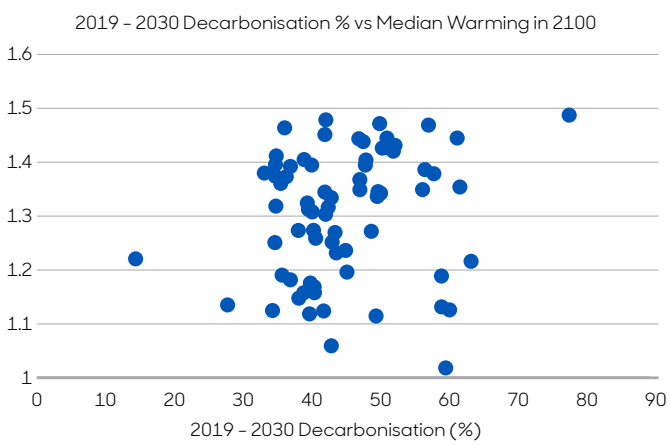
Challenges to Translating Paris-Alignment into Benchmarks

Portfolio-alignment relates to measuring how 'aligned' a portfolio is to the goals of the Paris Agreement. As shown in table 1, there are multiple Paris-alignment measures existing today. However, it is often the case that specific objectives such as a decarbonisation target is used to translate the concept of alignment. For example, the EU PAB and CTB apply a year-on-year 7% self-decarbonisation trajectory – in addition to a 50% and 30% initial decarbonisation, respectively.

However, a decarbonisation trajectory is forward-looking and when we consider the scenarios from the International Panel on Climate Change (IPCC), we can see that there is no single decarbonisation trajectory to achieve Paris-alignment, see figure 1. IPCC scenarios incorporate forward-looking assumptions about policy, technology costs and socio-economic factors over a long period of time. These assumptions will translate into different levels of required decarbonisation, based on staying within a carbon budget.

Moreover, these scenario projections from the IPCC consider the global economy. However, we have already highlighted in the section above that in practice traditional benchmarks are not always going to be suitable reflections of the real-economy. A potential solution to this is to define Paris-Alignment not by a single decarbonisation trajectory, as the EU PAB and CTB does, but by reflecting decarbonisation requirements at the sector-level.

Figure 1: IPCC 2030 Decarbonisation Pathways in 1.5°C Scenarios



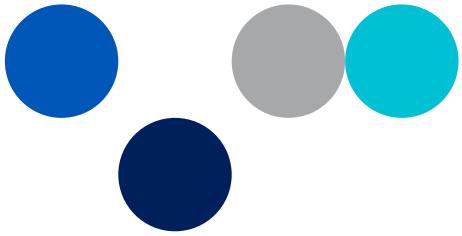
Source: IPCC AR6 C1 1.5°C no or limited overshoot scenarios (2022).

An additional consideration is how to consider the dynamic nature of carbon budgets. For example, if we see a quicker than expected decarbonisation in the Utilities and Transport sector, then this would allow for more breathing space for other sectors. In contrast, if global emissions do not fall, then the global carbon budget will get tighter year-on-year.

It is also worth noting that some companies within a benchmark may have already started their decarbonisation journey sooner relative to their peers. In which case an ongoing decarbonisation objective may penalise these companies as continued decarbonisation may be slower due to technology costs. Therefore, it is crucial to be aware of the impact of applying the same objectives across different regions and sectors.

[7] **Factsheets | FTSE Russell** (March 2023).

Climate Benchmark Challenges



Climate Solutions Are Not Always Low-Emissions

It is commonplace for investors to seek out both lower carbon intensity and a higher share of climate solutions. However, low-carbon and climate solution objectives are not necessarily complementary. Table 2 shows the top 5 climate solutions GICS sectors by green revenues, we can see that they are made up of high-emitting sectors such as utilities, industrials as well as consumer discretionary which includes autos. For the global economy to successfully address climate change, solutions must be found in the high emitting sectors. As such starving investment capital from these heavy emitting sectors could be detrimental to a low-carbon transition. Moreover, it is not necessarily the case that the higher green revenue companies within these sectors are less emissions intensive, since they may be avoiding emissions through their products and services.

Table 2: Top GICS Sectors by Green Revenues*

GICS Sector	Average GR%	Average S1+2 Intensity
Utilities	44	2582
Real Estate	32	121
Industrials	29	191
Information Technology	23	130
Consumer Discretionary	23	87

Source: FTSE Russell (2023). *Data only includes companies with green revenues.

When testing the correlation between green revenues and emissions, there is no significant correlation, even when adjusting for outliers, see table 3. This highlights the challenge of having disparate climate objectives.

Table 3: Climate Solution and Emissions Correlation

	Full Universe	Adj. for outliers*
Green Revenue – Emissions Correlation	-0.04	0.02

Source: Trucost, FTSE Russell (2023). *Excluded 95th percentile.

The benefit of combining an emissions objective with a climate solutions target is that it allows for investors to differentiate between companies in high-emitting sectors which are supporting the net-zero transition. However, to achieve this, asset managers need to test whether these set objectives when applied in practice produce the outcomes intended to meet investor objectives. As the impact of these objectives will vary in practice across different regional benchmarks.

In today's economy emissions are unavoidable while building out low-carbon infrastructure and other climate solutions. Only 27% of companies with green revenues are associated to activities that decarbonise a company's own emissions, while 66% of companies make products that are enabling customers to avoid emissions through their products and services. However, these enabling companies on average have a lower green revenue percentage, see table 4. This creates a potential bias towards companies with green revenues reducing their own emissions and away from companies producing green products and services that enable the wider economy to decarbonise. The rest of the companies are associated to companies involved in transitional activities that provide carbon reductions but are not aligned to achieving net-zero in the long-term.

Table 4: Type of Climate Solutions

	% of companies	Average GR %
Transitional Activity	7%	18%
Enabling Activity	66%	25%
Own Emissions	27%	34%

Source: FTSE Russell (2023).

Climate Benchmark Challenges

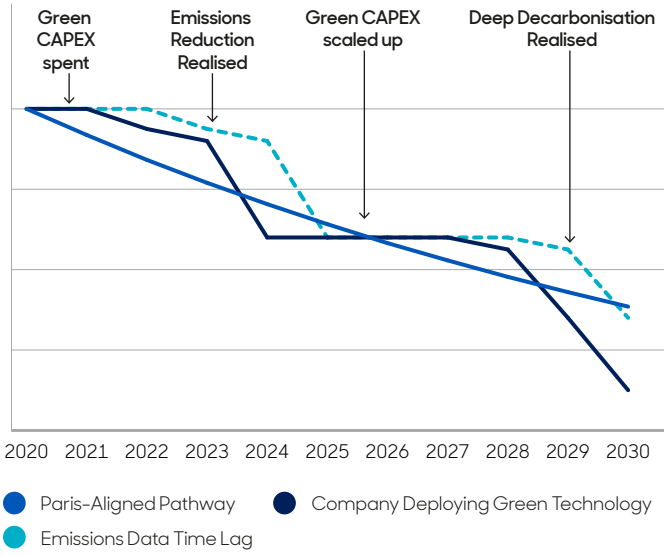
Investors, therefore, must be cognisant of the strengths and weaknesses of applying a decarbonisation and climate solutions dual objective. The practical outcomes and risks of unintended consequences will quite often be driven by the starting composition of the parent benchmark. Managers should have a grounded understanding of these considerations.

The Risk of Missing Out on the Climate Opportunities

Investors integrating sustainability themes often wish to allocate capital to firms providing solutions or transitioning to more sustainable business models. This requires a forward-looking view of a firm's sustainability credentials. This is a particular challenge in passive implementation due to the sparse availability of robust forward-looking data that can inform benchmark rules. However, it is also important to be aware of the limitations of backward-looking data to achieve a forward-looking objective. Emissions data and green revenues are backward-looking data. There will always be a time lag from when a company announces a green capex plan, to when the emissions impact is realised. This is particularly relevant for companies in hard-to-abate sectors that will achieve their low-carbon transition through a series of large infrastructure projects. This challenge is illustrated in figure 2, where a straight-line decarbonisation rate of 50% by 2030 vs a 2020 baseline is compared with actual emissions reductions. The dotted line represents the additional time lag for when realised emissions impact are reported and captured in company data.

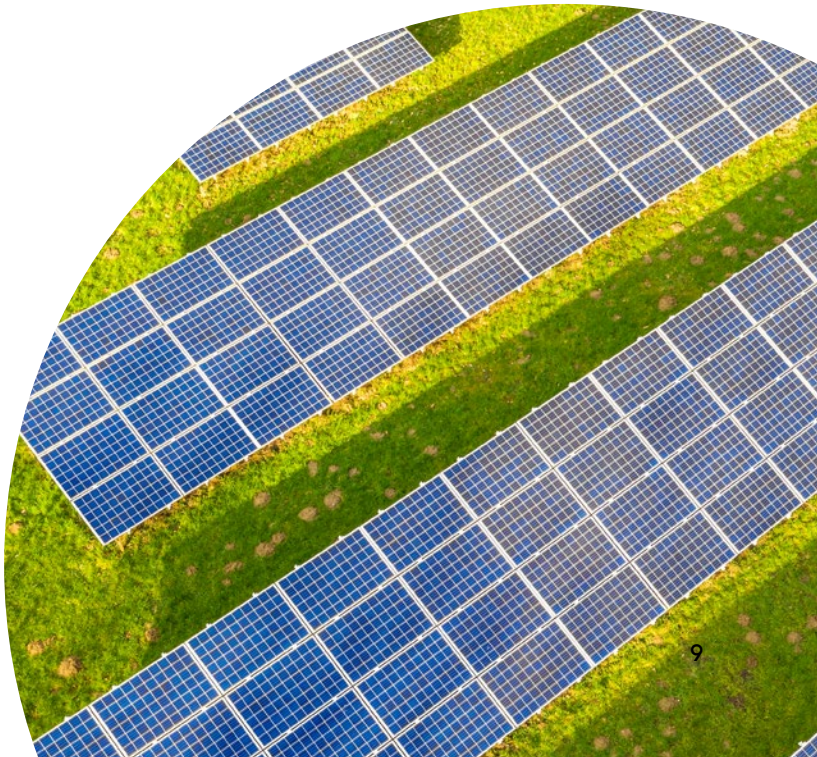
Figure 2: Decarbonisation Time-Lag

Emissions Reduction



Source: abrdn.

As green taxonomies become more mature and are rolled out, we expect to see an improvement in the breadth of green revenue and green capex reporting from corporates. This will help improve investor understanding of how corporate strategy can translate to achieving stated emissions targets. This will help inform investors and managers seeking to allocate capital to transition leaders.



Climate Benchmark Challenges

Climate Benchmarks should be designed to meet client needs

It is important that climate benchmarks are not boxed into a single definition but rather they should have room to account for client needs and innovation. Flexibility also allows for trade-offs to be examined more thoroughly and for sectoral and regional biases to be considered. Whether trade-offs relate to financial or non-financial objectives, they should be transparently acknowledged during the design of a benchmark strategy. This sentiment is echoed by the Net Zero Asset Owner Alliance (NZAOA) principles for net-zero aligned benchmarks.

Case Study:

NZAOA Principles for net-zero aligned benchmarks for index universes.[8]

The principles emphasise the need for both transparency and flexibility. Net-zero benchmarks should offer investors with transparency to understand the criteria that determine benchmark weights. The benchmarks should also have the flexibility to account for the varying level and speed of decarbonisation across sectors and regions, certain client objectives and comparable metrics to parent indices.

Climate benchmarks have produced heterogenous results, despite often targeting the same objectives. Moreover, investors will have different objectives, making it crucial for these differences to be accounted for across:

- Sustainability objectives
- Return objectives
- Risk objectives
- Cost objectives

A certain level of flexibility in design is necessary for investors to address the challenges laid out above. In the next section, we go into more detail on how the most recent EU CTB and PAB benchmarks have been applied across the market, related challenges and practical solutions.

[8] Net-Zero Asset Owner Alliance Calls for Development and Uptake of Net-Zero Aligned Benchmarks – United Nations Environment – Finance Initiative (unepfi.org).

EU Paris-Aligned and Climate-Transition Benchmarks

In 2019, EU regulations introduced two climate benchmarks, the Climate Transition Benchmark (CTB) and Paris Aligned Benchmark (PAB)[9].The EU Technical Expert Group on Sustainable Finance outlined the purpose for the climate benchmarks as follows:

- Direct capital flows to assets that will enable a net-zero transition.
- Hedge against climate transition risks (Risk objective) but also have the ambition to direct their investments towards climate opportunities (Opportunity objective).
- Increase transparency of investors' impact with regard to climate change.
- Strike a balanced trade-off between comparability of climate benchmark methodologies and flexibility in design.
- Provide investors with a climate benchmark that is aligned with their investment strategy.
- Disincentivise greenwashing.

The number of goals that the benchmarks seek to satisfy, makes them highly complex, particularly because these goals are not easily reflected into benchmark construction rules.

The principal objective of the benchmark is emissions reductions. The PAB, targeting an initial 50% emissions reduction versus the parent, and the CTB an initial 30% emissions reduction, versus the parent benchmark. From that base, self-decarbonisation of the benchmark must take place at a rate of 7% annually. The emissions intensity metric is calculated using Enterprise Value Including Cash (EVIC), with an average inflation adjustment mechanism. For fixed income benchmarks the emissions metric can be an absolute emissions metric or the intensity metric.

The benchmarks seek to incorporate scope 3 emissions data for energy, mining, transportation, construction, buildings, materials and industrial sectors. Additional constraints include exclusions applied to companies involved in controversial weapons, tobacco and companies violating UNGC principles. While PAB exclusions go further to exclude companies in fossil fuel activities.

Currently, the EU CTB and PAB dominate the 'climate benchmark' offerings in the marketplace. However, as outlined in previous sections, a one-size-fits-all approach is unlikely to be suitable. So what are the main challenges when implementing the CTB and PAB approach?

Transparency Challenges

A clearly stated objective of the benchmarks is to improve transparency regarding an investor's climate change impact. But it is not clear that the EU approach increases transparency. There is no acknowledgement that the stated objectives may conflict with one another in practice. The implications of satisfying both the objectives of an annual decarbonisation target and directing capital to climate solutions will vary across different regions. Secondly, the use of emissions metric with an inflation adjustment component reduces predictability and can lead to unintended consequences.

This is because there are various components in the emissions intensity metric that will drive the result. For example, the emissions intensity denominator, EVIC, is impacted by changes in market capitalisation and total debt. However, what is even more important to consider is how these changes can also impact parent benchmark weights. For example, market capitalisation will impact the weight of a company in an equity parent benchmark as well as the company's emissions intensity. Therefore, the changes in these variables are not just relevant at a single company level but are also important when compared to changes to all other company constituents in the benchmark. Notably this volatility may be unrelated to the fundamentals of the long-term net-zero transition. We have previously published research on the volatility of carbon metrics[10].

[9] EUR-Lex - 32020R1818 - EN - EUR-Lex (europa.eu).

[10] Why the Choice of Carbon Metrics Matter (abrdn).

EU Paris-Aligned and Climate-Transition Benchmarks

A significant added layer of complexity is the EVIC inflation adjustment, applied to each individual holding using the average change in EVIC of the whole benchmark. Changes in EVIC are idiosyncratic across companies and therefore using a single average EVIC inflation adjustment can lead to unintended consequences. For example, carbon-intensive companies may see an increase in EVIC while markets more broadly may experience a fall in EVIC. In this case the EVIC inflation adjustment may lead to overweighting carbon-intensive companies, creating a tension between satisfying the decarbonisation target.

It is worth noting that in October 2022, the EU Platform on Sustainable Finance recommended that the European Commission consider revising the EVIC inflation adjustment to be calculated at the security level instead of the benchmark level[11]. While this is a potential solution to this particular benchmark rule, it comes with its own challenges, such as, how to handle the growth of climate solution companies that may see an absolute increase in emissions as they grow.

Reflective Challenges

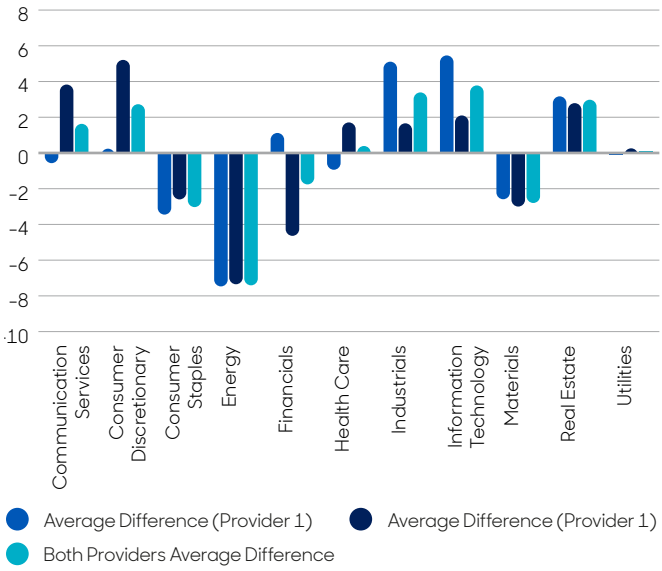
It has become evident that existing PABs and CTBs may not reflect the intended investment universe. Notably, the benchmarks seek to allocate capital towards companies enabling net-zero and to also disincentivise greenwashing by improving transparency.

Despite having a sector constraint to achieve these objectives, in practice, it has the effect of increasing sector risk in immaterial sectors. For example, we have seen that in practice equity climate benchmarks tend to overweight sectors such as Information Technology, Consumer Discretionary, Communication Services and Health Care – which tend to be less material sectors with respect to the climate transition, see figure 3 .

To disincentivise greenwashing a 'super-sector' constraint is applied, whereby the sum of 'high impact sectors' must be equivalent to the parent[12]. The high-impact sectors are defined using NACE codes (see appendix), which do not align perfectly with sector classifications used by investors such as GICS and BICS. In practice the impact of the 'super-sector' constraint on equity climate benchmarks is expressed as an overweight in Real Estate and Industrials to make up for underweighting of Energy and Materials, we can see this outlined in figure 3. Therefore, investors should be aware that the 'super-sector' constraint does not control for taking sector bets. Instead, it increases sector bets in the lower carbon 'high impact' sectors.

Figure 3: Equity PAB Index Provider Sector Weights vs Parent Benchmark Sector Weights

Difference of PAB vs Parent



Source: abrdn (2023).

[11] https://finance.ec.europa.eu/system/files/2022-10/221011-sustainable-finance-platform-finance-report-usability_en_1.pdf.

[12] High Impact Sectors as defined by the EU: NACE section codes A to H, and L.

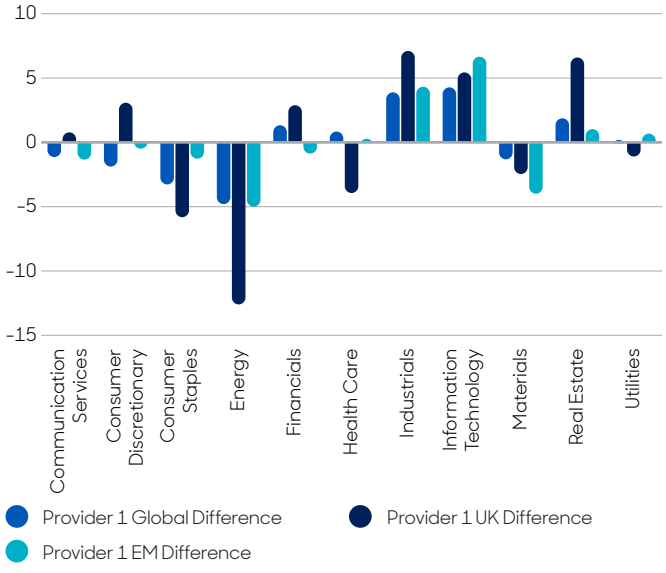
EU Paris-Aligned and Climate-Transition Benchmarks

Investors should consider that the highest emitting companies are often found in hard-to-abate sectors. A sector-by-sector approach may be a more appropriate than the use of NACE code high impact super-sector constraints. Thoughtful benchmark design could help to mitigate outsized sector bets and to focus more on allocating capital towards companies within hard-to-abate sectors that are deploying climate solutions key to achieving a net-zero transition.

The impact of these sector allocations will vary not just by index provider but also across regions, see figure 4 and 5. This is important to assess in the context of the starting composition of the parent benchmark. For example, in equity climate benchmarks we see the largest underweighting being Energy in the UK regional benchmarks, primarily due to the high initial weight of Energy in the UK parent benchmark. It is not uncommon to see sector bets vary across the regions, we see this for Utilities for both index providers and for Consumer Discretionary for Provider 1 and Industrials for Provider 2. This emphasises the heterogenous outcomes of the climate benchmarks across regions and index providers.

Figure 4: Equity Index Provider 1 PAB Sector Weights vs Parent Benchmark Sector Weights

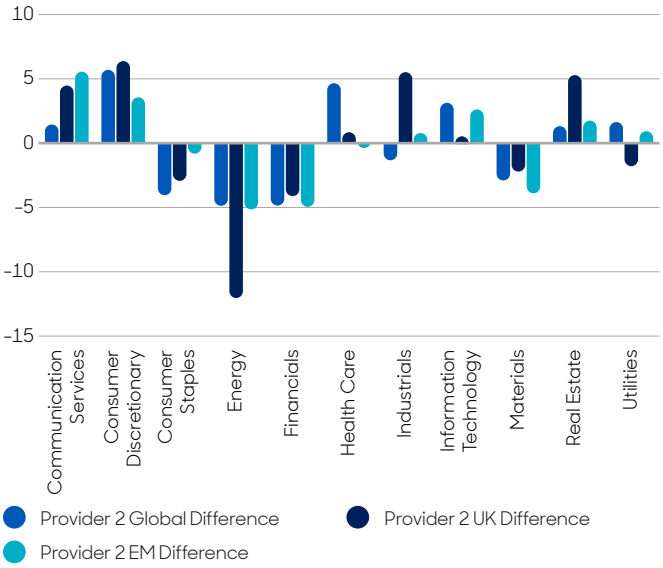
Difference of PAB vs Parent



Source: abrdn (2023).

Figure 5: Equity Index Provider 2 PAB Sector Weights vs Parent Benchmark Sector Weights

Difference of PAB vs Parent



Source: abrdn (2023).

In fixed income, corporate bond parent benchmarks tend to have a significant allocation towards the Financial sector. For example, the Financials sector weighting in the Iboxx Euro Corps is more than 40%. Financials have considerably lower Scope 1 & 2 emissions relative to sectors such as Utilities, Industrials and Materials. Moreover, Scope 3 reporting is nascent across most sectors, including within Financials, where the majority of emissions will be found in the investments category of Scope 3 (category 15). Due to this, there is a prevalence of reallocating exposure towards Financials in fixed income climate benchmarks, see table 5, predominantly to achieve the set decarbonisation objective. However, in practice, this overweighted allocation is unlikely to have a significant positive real-world climate impact. For example, Banks are still actively lending to fossil fuel producing sectors and with only the exception of a few banks, there are no robust plans to curb lending.

EU Paris-Aligned and Climate-Transition Benchmarks

Table 5: Financial Sector Weightings in Fixed Income PAB Indices

	Parent	Provider 1	Provider 2	Provider 3
Financials Weighting (%)	43.2	44.4	47.3	46.5

Source: abrdn (2023).

Assessing fixed income PABs further we find considerably different approaches to diversification and concentrations between index providers. We have used a parent benchmark for Euro Corporates as a basis to compare the divergence in the overlap in Issuers, see table 6. We see Provider 2 has 325 issues in its PAB index, which is 45% less than the parent (695 issuers). In addition, over 90% of the issuers in the index of Provider 2 can be found in the Euro Corporates Parent index. This has therefore resulted in the issuer weights being scaled up, in some instances materially. For example, one issuer's has been scaled up 2.5 times. Similar impacts for all PABs can be seen in figure 6, where in all instances the average Issuer size (in portfolio value terms) has increased. Managers need to consider how these outcomes will impact the characteristics of diversification, yield, duration risk and credit ratings of fixed income climate benchmarks.

Table 6: Issuer Weight Characteristics in Fixed Income PAB Indices

	Parent	Provider 1	Provider 2	Provider 3
Number of Issuers	695	590	325	473
Number of Issuers also present in the Euro Corps Parent index	695 (100%)	590 (100%)	298 (91%)	466 (99%)
Maximum Issuer size (Portfolio Value %)	1.74%	1.71%	3.08%	2.12%
Average Issuer size (Portfolio Value %)	0.14%	0.17%	0.31%	0.21%

Source: abrdn (2023).

The level of differences we see between index providers is not something we find in traditional market benchmarks, the differences are being driven by a number of factors:

- Index providers will have different data sources resulting in differences in data coverage, approach to estimations and inclusion of Scope 3 emissions data.
- The coverage and methodology of climate solutions data.
- How company emissions targets are incorporated.
- Approach to exclusions such as Tobacco, Controversial Weapons, Conventional Weapons, Fossil Fuels.
- Inclusion of non-climate sustainability objectives (for example ESG scores, non-climate exclusions, ethical screens).

Aligning Climate and Investment Objectives

Ensuring sustainability objectives can be met along with investment objectives is important. Managers should assess how benchmark objectives and constraints impact tracking error, overall active money, individual security active weights, turnover versus the parent and liquidity. At a more granular level, identifying the drivers of these are critical. For example, whether this is driven by country risk, sector risk and active factor exposures.

When considering passive implementation, a decision must be made around the use of a tilting methodology versus an optimiser. Typically, tilts are preferred due to the transparency of how weights of securities are being determined. In contrast, optimisers may be less transparent but can produce more optimal outcomes for lowering tracking error and targeting active weights more efficiently.

However, it is worth noting that as complexity increases, for example, due to targeting multiple objectives, the transparency benefit of tilting gradually diminishes. Moreover, tilting across multiple objectives can exacerbate unintended consequences such as higher sector or individual stock concentrations. Optimisation can help control these factors in a more efficient manner.

EU Paris-Aligned and Climate-Transition Benchmarks

We can see this playing out when comparing an EU CTB benchmark from the same provider, one using an optimiser and the other using a tilt. Firstly, we can see that the tilt version of the benchmark has considerably higher tracking error relative to the optimised CTB for both developed market and emerging market regions, see table 7 and 8.

Table 7: Emerging Market CTB Tracking Error Comparison: Optimisation vs Tilt

Tracking Error	EM Parent	EM CTB Opt	EM CTB Tilt
EM Parent		1.9	3.9
EM CTB Opt	1.9		3.8
EM CTB Tilt	3.9	3.8	

Source: FactSet, abrdn (2023).

Table 8: Developed Market CTB Tacking Error Comparison: Optimisation vs Tilt

Tracking Error	DM Parent	DM CTB Opt	DM CTB Tilt
DM Parent		1.7	2.1
DM CTB Opt	1.7		2.2
DM CTB Tilt	2.1	2.2	

Source: FactSet, abrdn (2023).

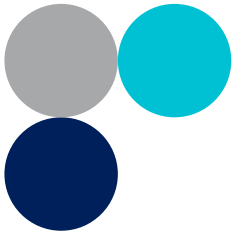
When assessing the sector weights, we can see a considerable difference in the sector bets being placed between the tilt and optimised version of the benchmark. Firstly, we can see that the tilt version tends to take larger sector bets and at times may even take the opposite bet relative to the optimised approach, as is the case for the Industrials sector, see table 9.

Table 7: Emerging Market CTB Tracking Error Comparison: Optimisation vs Tilt

	Developed Market CTB	Developed Market CTB	Emerging Market CTB	Emerging Market CTB
GICS Sector	CTB opt	CTB tilt	CTB opt	CTB tilt
Consumer Staples	0.3%	-0.9%	2.6%	-1.4%
Information Technology	1.2%	6.5%	0.5%	6.9%
Industrials	0.6%	-0.8%	-1.7%	1.5%
Materials	-0.5%	-1.8%	-2.1%	-1.8%
Energy	-1.3%	-4.8%	-0.5%	-3.6%
Real Estate	0.7%	0.4%	-0.2%	0.0%
Financials	1.5%	-1.3%	1.4%	-1.8%
Communication Services	-1.0%	-0.6%	-0.2%	-1.7%
Health Care	0.5%	3.6%	0.4%	1.0%
Utilities	-0.8%	-1.4%	-0.6%	-0.8%
Consumer Discretionary	-1.2%	1.2%	0.5%	1.6%

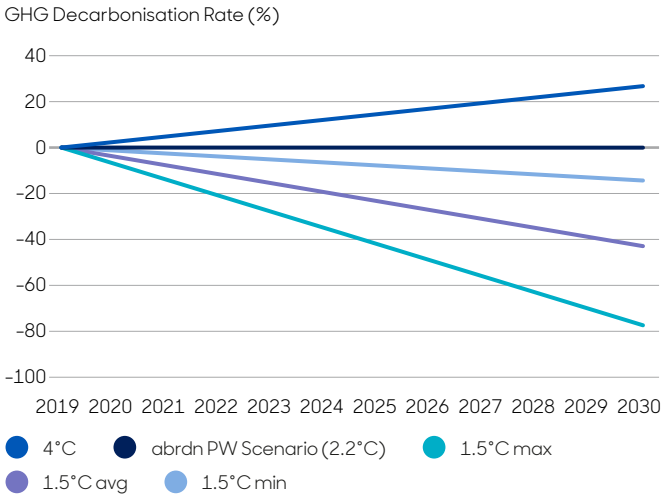
Source: FactSet, abrdn (2023).

An added complexity to consider is that climate objectives may become increasingly restrictive over time, such as a self-decarbonisation target. This can be illustrated by a wedge that could grow between the emissions profile of the parent benchmark and climate benchmark. In figure 6, we show the 2020 – 2030 decarbonisation pathways across various temperature pathways, the abrdn probability weighted scenario projects an acceleration in decarbonisation after 2030 and projects a warming of 2.2°C accounting for current policies, technologies and actions. This creates a risk that a climate benchmark experiences higher turnover and widening tracking error versus the parent benchmark overtime, depending on how the parent composition reflects the real world.



EU Paris-Aligned and Climate-Transition Benchmarks

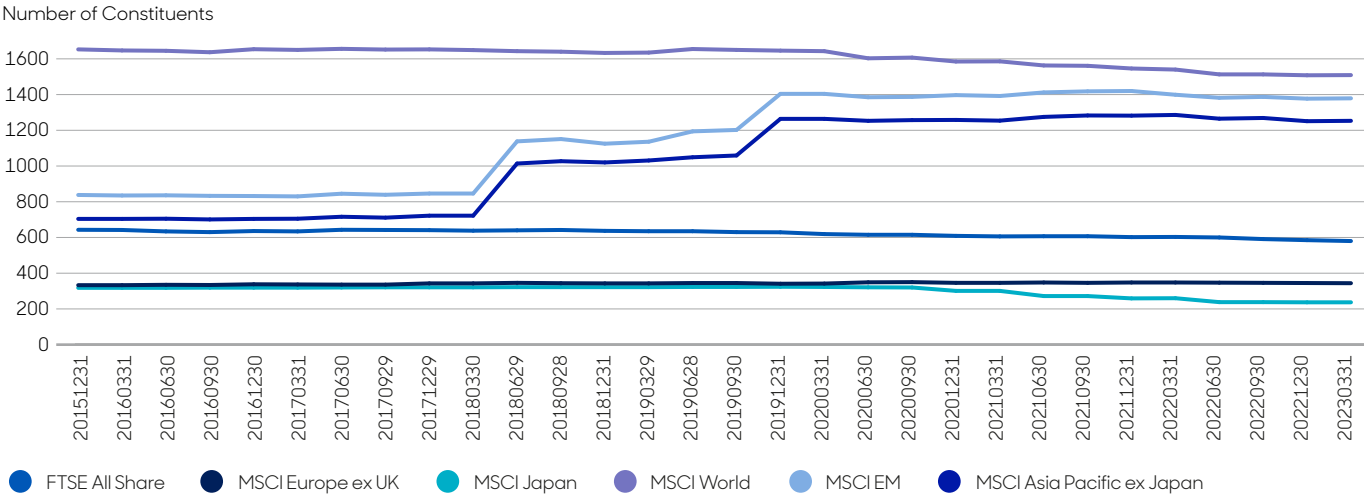
Figure 6: Emissions Wedge



Source: abrdn (2023).

An additional consideration is how changes in the underlying traditional parent benchmarks evolve overtime. For example, the number of constituents in regional indices will change overtime. This impacts the absolute size of the opportunity set for managers to achieve investor objectives. We have seen the number of constituents in MSCI World, MSCI Japan and FTSE All Share contract, reducing the opportunity set to achieve investor objectives. Meanwhile the constituents in MSCI EM and MSCI AC Asia Pacific ex Japan have increased by 65% and 78% respectively since 2015, see figure 7. One of the drivers of this is the inclusion of China A Shares in these indices, broadening the opportunity set for investors. These compositional changes at the parent level will inevitably have an evolving impact on the viability of meeting investment and sustainability objectives.

Figure 7: Number of Constituents Evolving in Parent Benchmarks



Source: FactSet (2023).

Considerations of Passive and Active Implementation

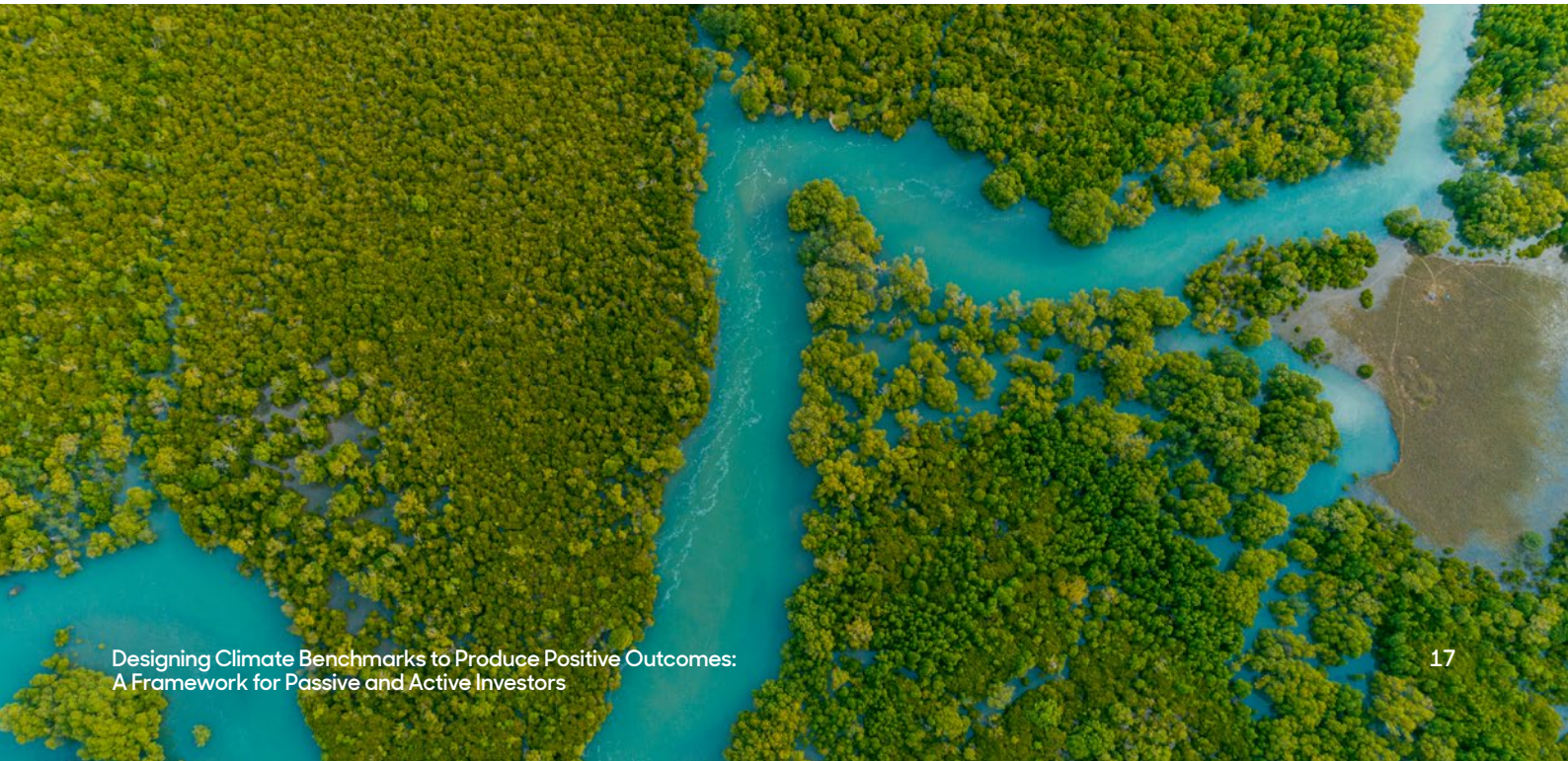
The considerations addressed below are not comparing active versus passive. Instead they consider the use of climate benchmarks in active and passive implementation, in isolation from one another.

The choice of active or passive implementation comes after understanding a client's sustainability objectives, investment objectives and cost objectives.

Sustainability issues can be effectively implemented whether investors seek active or passive implementation. While there is overlap on the challenges faced when designing a climate benchmark there are also differences. Table 10, below provides further clarity of the pros and cons of utilising climate benchmarks.

Table 10: Passive and Active Climate Benchmark Considerations

	Passive	Active
Pros of Using a Climate Benchmark	• Cost efficient implementation of sustainability criteria. • Data-driven targeting of specific sustainability objectives. • Broader market ownership enables wider scope of engagement on sustainability issues.	• More reflective benchmark of a client's sustainability objectives if well designed. • Can allow for more concentrated exposure to the sustainability theme, where broad market exposure is not a priority to the client. • The design of the benchmark can improve transparency of the non-financial objectives of an investment mandate, if well designed.
Cons of Using a Climate Benchmark	• Certain sustainability data may not be mature enough to cover the broad market across all sectors and regions of a parent benchmark. • Sustainability objectives are not always going to be complementary to one another. • Tracking error and turnover is likely to be higher versus traditional parent benchmarks. • It may be difficult to understand the main drivers of changes to weights in the climate benchmark.	• Sustainability objectives may constrict the investment universe to sectors that are immaterial to the sustainability theme. • It may be difficult to understand the main drivers of changes to active bets relative to the benchmark. • Active managers can add value which is not easy to reflect in benchmarks, for example, assessing the credibility of carbon targets or the GHG impact of green revenues, which may force the active manager to go off-benchmark and increase active bets.



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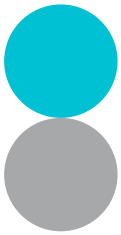

Regardless of whether an investor opts for an active or passive implementation, managers must be clear on how to meet client objectives. This paper has outlined some of the key practical challenges associated with sustainability benchmarks, focussing on climate. We summarise below some of the solutions that can help investors navigate these challenges, regardless of the selected implementation approach.

Starting with Transparent Climate Objectives

Incorporating multiple benchmark constraints can create ambiguity. This is why it is important to outline the investor's objectives clearly before beginning benchmark design and construction. With objectives clearly outlined from the start, managers can more evidently investigate trade-offs and challenges when designing benchmarks. The following steps should be taken:

1. Clearly define the financial and sustainability objectives of the strategy.
2. Assess whether these objectives come with potential trade-offs and understand the magnitude of these trade-offs.
3. Test these objectives and trade-offs transparently and ensure the construction of the benchmark meets the criteria outlined below for a well-designed benchmark.

This can also help to determine to what extent the strategy should reflect the risk-return profile of the parent benchmark or the risk-return profile of the sustainability theme, which helps determine the appetite for active risk against the parent benchmark.

Control for Multiple Carbon Metrics

It is possible to control for multiple carbon metrics. This can help to mitigate the risk that short-term financial volatility does not drive carbon metrics and result in unintended consequences. For example, managers can design benchmark rules to control for carbon intensities that normalise emissions by EVIC as well as carbon intensities that normalise emissions by revenue. This helps to ensure that the denominators of revenue and EVIC are not inadvertently driving outcomes as opposed to changes in emissions.

An Active Approach to Sustainability Data

Managers should be keenly aware of how sustainability data evolves over time. Sustainability data varies considerably, for example, there is company-reported data, such as carbon emissions, data impacted by policy drivers such as how taxonomies impact green revenue classifications, or third-party methodologies like ESG scores. All of these factors are likely to evolve as data coverage increases, standards evolve, and methodologies adapt. Over time this will impact the outcomes of existing benchmark construction rules. Managers should acknowledge these issues and be prepared to ensure benchmark outcomes continue to be aligned with investor objectives.

Controlling for Unintended Biases: Sector, Country, Style, Stock-Level Assessments

Incorporating sustainability objectives can introduce biases across multiple fronts and to varying degrees. For example, solely implementing an emissions objective will have a negative bias predominantly at the sector-level. Benchmarks with global exposure that apply climate objectives will have regional biases that can vary based on the type of objective being targeted. We have seen that there are green revenues across sectors so a climate solutions objective will have certain biases within sectors. Each of these biases will be nuanced and their magnitude will depend on the starting composition of the parent benchmark.

It is important to test for these biases and evaluate their impact on wider objectives. These can be addressed in several ways. For example, by adopting more flexible sector and geographical constraints with +/- weight limits, this allows for some flexibility in optimising for other objectives. This can allow an investor to remain invested in sectors but provide more flexibility compared to requiring an equal weighting rule.

abrdn Solutions to Climate Benchmark Design Challenges

Consider Rebalancing Frequency and Timing

Given the ongoing evolution of data coverage, estimation methodologies and the use of other sustainability factors, considering the potential impacts of rebalancing is important. Rebalancing once a year may heighten the risk of unintended consequences due to the volatility in some sustainability-related metrics, such as carbon intensity. This can also have negative impacts on transaction costs and may increase implementation risk depending on liquidity constraints. Managers should seek to understand the optimal frequency of rebalancing, as having more frequent rebalance periods can smoothen out turnover implementation risk and capture the most up-to-date sustainability data.

A Layered Approach to Match Sustainability Objectives

Taking a layered approach to climate objectives may also be optimal depending on the objectives investors are targeting. This can allow investors to prioritise certain objectives, while incorporating multiple objectives and mitigating for potential unintended consequences such as high turnover.

A Sector Focussed Approach

Applying a more focussed sector-by-sector approach is possible. This still comes with challenges given that sectors are not homogenous and some are made up of conglomerate companies. Nevertheless, having a focused sector approach can allow for investors to stay broadly invested across sectors and allocate capital towards leaders within sectors, rather than taking outsized sector bets.

Passive Implementation with Active Engagement

Investors should also be cognisant of how levers such as engagement can be utilised. While there is a perception that engagement is less relevant to passive strategies because of the rules-based nature of allocations. However, this is not necessarily true for sustainable passive investing, due to constraints that can underweight or exclude companies entirely. Moreover, passive investors are well positioned for broad-based engagement across the investment universe given broad-based market ownership. As such a key lever in producing positive real-world outcomes is for passive and active investors to engage with companies and exercise their voting rights, to ensure the risks and opportunities posed by climate change are being acted upon.

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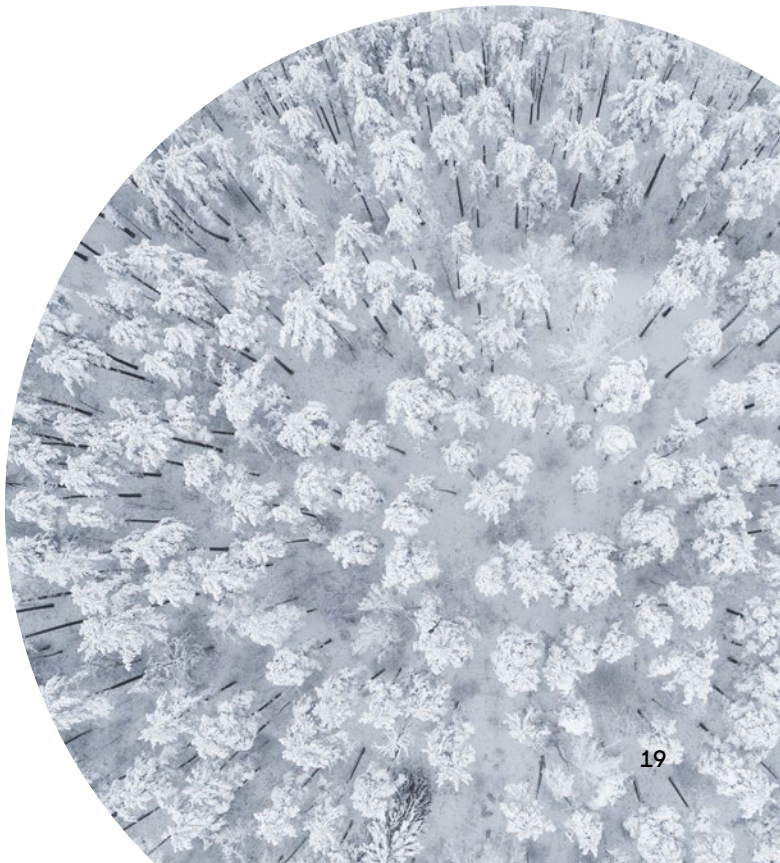

Appendix

NACE Codes:

A – Agriculture
B – Mining and Quarrying
C – Manufacturing
D – Electricity, Gas, Steam and Air Conditioning Supply
E – Water Supply; Sewerage; Waste Management and Remediation Activities
F – Construction
G – Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles
H – Transportation and Storage
L – Real Estate Activities

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