

IIGCC

Enhancing the Quality of Net Zero Benchmarks



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Summary

Investors are increasingly committed to aligning their portfolios with a net zero target. Meanwhile, a significant portion of capital traded in the public markets is increasingly being allocated to strategies that track or seek to outperform a given benchmark. To ensure that more capital is in alignment with net zero targets, passive and active investors will benefit from sound net zero benchmarks that balance the need to incentivise real world emission reductions, whilst also reflecting the investable universe of traditional benchmarks to allow for greater adoption.

Index providers have responded to investor interest in climate objectives and are using a range of approaches to construct net zero benchmarks (view [Table 4](#) in the Appendix¹). In 2019, the EU climate benchmarks regulation² provided standards for 'climate benchmarks', with the intention of reducing real economy emissions, as well as incorporating multiple other objectives. These include reducing investor risk derived from climate change, increasing exposure to climate-related opportunities and disincentivising greenwashing.

The regulation establishes the criteria that a benchmark needs to meet in order to be classified as an EU Paris Aligned Benchmark (PAB) or Climate Transition Benchmark (CTB), with a heavy focus on emission reductions. This includes reducing the benchmark GHG intensity or absolute GHG emissions (Scope 1, 2 and 3) by 50% and 30%, respectively, relative to the investable universe, and reducing GHG intensity or absolute GHG emissions by at least 7% per annum.

Index providers and benchmark users (i.e., asset managers, asset owners, and individual investors) face several unique challenges when constructing or utilising net zero benchmarks in comparison to traditional market benchmarks. These span the availability and quality of climate data, complexities around forward-looking metrics, evolving definitions and lack of a precise taxonomy, and the complexities around incorporating stewardship and engagement actions.

Recognising these challenges, IIGCC formed a working group to evaluate ways of enhancing the quality of net zero benchmarks, so that net zero alignment with the Paris goals becomes an attainable objective for a wider range of market participants. The group engaged with eight index providers on their net zero offerings to understand the current state of play in the market and what they consider feasible from a benchmark construction perspective. The working group also assessed the advantages, disadvantages, and consequences of the EU regulation.

The eight participating index providers:

[Bloomberg](#)

[FTSE Russell](#)

[ICE Data Indices](#)

[MSCI](#)

[Qontigo](#)

[S&P Global](#)

[Scientific Beta](#)

[Solactive](#)

An early conclusion was that this conversation has advanced at a different pace across asset classes. Net zero benchmarks for equities are most advanced, while more progress is needed with regards to fixed income net zero benchmarks, particularly for sovereign bonds. Given the lack of integration of sovereign bond holdings into net zero investment strategies, innovation in benchmarks reflecting this asset class has proved particularly challenging. This leaves significant scope for future guidance to support this innovation.

The working group further concluded that while the EU climate benchmarks regulation has provided a step in the right direction, they do not meet the full ambitions of an investor targeting net zero. In practice, benchmarks implementing the regulations have a tendency to comply with emission reduction targets through capital reallocation, achieving emissions reductions by reducing the weight of the highest emitting sectors relative to others. This is not seen as best practice by the working group, whose recommendations aim to promote real world emissions reductions.

This paper aims to reflect the collective view of the participants in an effort to provide guidance and promote best practice in the construction of net zero benchmarks. The working group sees advantages for market participants refocussing net zero benchmarks through the incorporation of the recommended principles, as well as a superior outcome for the economic transition towards net zero.

¹ Please note the descriptions of net zero offerings in the market have been provided by the index providers

² [EU climate benchmarks regulation](#)

Key Principles

The working group identified **five key principles** for the construction of net zero benchmarks which can help achieve the ambitions of net zero investors:

1 Prioritise real world emissions reductions.

Benchmark design should be informed by the incentives they would create in practice. To the extent possible, net zero benchmarks should favour avenues to enhance real world 'organic' emissions reductions, over 'paper decarbonisation'.

2 Ensure transparency of benchmark rules and their consequences.

Index providers should grant full disclosure on how constituents of a benchmark are selected and weighted and disclose any unique features (such as treatment of offsets, decarbonisation pathways, methods and assumptions), to limit the 'black box' nature of the methodologies. The most successful benchmarks have a high degree of predictability over which companies are included on index rebalancing dates and this should be the objective of net zero index providers. Publishing regular ex-post attribution analysis to understand how the emissions reductions are being derived from the investable universe is recommended. Transparency allows investors to make informed and effective investment decisions and, crucially, it helps constituents predict the steps they need to take to be selected into the index.

3 Incorporate a sectoral and regional based approach.

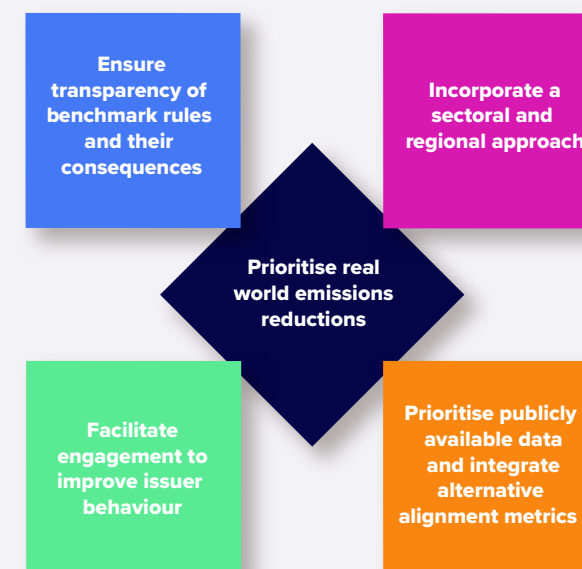
Benchmarks should recognise that different speeds of adjustment are required for different sectors and regions. They should adopt a science-based approach to emissions reductions in high-emitting sectors to ensure a just transition. Such an approach brings the benchmark closer to the decarbonisation path of the real economy, which makes the benchmark more representative of the investable universe, helping asset allocators for whom the predictability of returns is important. This would encourage greater adoption of net zero benchmarks by both active and passive investors.

4 Prioritise publicly available data and integrate alternative alignment metrics.

Net zero benchmarks can make use of a range of alternative metrics that better reflect the transition potential and enhance real world emissions reductions. Incorporating forward-looking metrics and forward-looking information can facilitate lower and more predictable portfolio turnover relative to an index using financed emissions alone. Applying a carbon budget with sectoral benchmarks will align more closely with scientific modelling and hence market confidence in the applicability of the benchmark. Also, considering incorporating metrics that indicate if a constituent is providing investment in climate solutions and enabling activities, such as green capex, will expand exposure and facilitate greater funding to the companies that are key to the transition. Lastly, favouring companies with reported emissions data versus estimated data can encourage greater corporate disclosure.

5 Facilitate engagement to improve issuer behaviour.

Net zero benchmarks should maximise their opportunities for engagement to improve issuer behaviour. While these would differ across asset classes, this can be done, for example, by embedding climate performance-related signals into the construction methodology and communicating these to potential benchmark constituents. Implementing progressive criteria that utilises the type of metrics suggested above can act as a default escalation strategy. For instance, integrating the Net Zero Investment Framework's alignment maturity scale to enable appropriate selective divestment decisions. This should be considered as an area for innovation amongst index providers.



The principles are intended to be implementable across asset classes as high level guidance. However, index providers and investors should be wary of nuances between the asset classes; for example, when it comes to engagement and the approach to exclusions. A differentiated approach to exclusion/divestment may be appropriate for corporate fixed income investments, and just transition concerns need to be considered when investing in sovereign bonds.

Benchmarks are complex, multi-faceted products and there is no easy way of creating the perfect net zero-aligned benchmark. However, the proposed principles aim to provide initial guidance on a net zero benchmark's construction, maintenance and reporting which should be seen as best practice to enhance real world decarbonisation. Ultimately, robust net zero benchmarks that are transparent, recognise sectoral and regional pathways, consider a range of alignment metrics, and emphasise engagement will better reflect the investable universe of net zero benchmarks compared to traditional benchmarks. This therefore increases their return predictability and facilitates the uptake of net zero-aligned market indices.

The broad principles and specific recommendations are compatible with the Net Zero Investment Framework³, the most widely implemented methodology for aligning portfolios with net zero objectives by signatories of the Net Zero Asset Managers and Paris Aligned Asset Owners initiatives. The principles aim to foster real world emissions reductions, which is the primary motivation of the NZIF, by enhancing disclosure recommendations, sectoral and regional granularity, alignment criteria, selective divestment and engagement actions.

The principles see considerable overlap with those advocated by the Net Zero Asset Owner Alliance⁴, indicating a strong and consistent set of preferences from investors seeking to achieve net zero and suggesting that index providers implementing such principles are likely to lead market adoption of net zero benchmarks. This paper provides more specific recommendations to support index providers and investors in applying the principles.

IIGCC would like to thank the working group co-leads, Paul Howard, Scottish Widows and Lupin Rahman, PIMCO, for steering the work of this paper, as well as all of the working group participants for their continued contributions in 2022 and 2023. IIGCC would further like to thank the eight index providers who presented to the working group and were engaged in correspondence throughout the process, and MSCI and Scientific Portfolio for providing analysis.

³ [Net_Zero_Investment_Framework_final.pdf \(parisalignedassetowners.org\)](#)

⁴ [Development and Uptake of Net-Zero Aligned Benchmarks: A call to action for asset owners and index providers – United Nations Environment – Finance Initiative \(unepfi.org\)](#)



Introduction – The growing importance of benchmarks

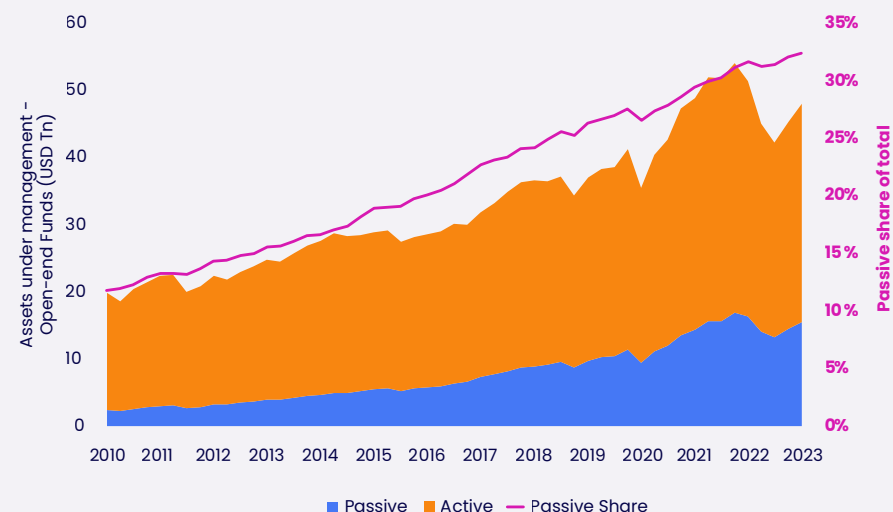
Benchmarks and market indices⁵ describe the performance of a given security market, market segment, or asset class, and they play an increasingly decisive role in financial markets. They are created by aggregating sets of securities and/or assets based on pre-set criteria, and their value and composition is determined by pre-established rules. Since, by definition, they are rules-based, transparent, and investable, benchmarks serve as a standard point of reference against which the performance of an investment strategy can be measured. In essence, benchmarks and their underlying constituents often represent the investable universe of an investment strategy and form the basis for evaluating the performance of portfolio managers.

Passive investment strategies have a mandate to track or replicate the performance of a given benchmark. In contrast, the mandate of active investment strategies is to outperform a given benchmark through active selection and trading of individual securities. While minimising tracking error (i.e., the difference between the return of an investment portfolio and that of its benchmark) is the main goal of passive strategies, active strategies also need to consider the tracking error to ensure that their strategies do not deviate from the investment mandate. As the tracking error increases, so does the risk of significantly underperforming (or outperforming) the benchmark.

The market share of investment vehicles that track a benchmark has grown steadily over the past three decades. Passive investing has emerged as an easy and cost-efficient way to access leading market indices, standardised risk factors, and sectoral or thematic baskets. As of 31 March 2023, over 30% of global public market assets under management in open-end funds (approx. US\$15.5 trillion) are invested in passive strategies tracking a pre-specified benchmark (see Figure 1)⁶. Given the size of passive investing, as well as the importance of benchmarks for active investment strategies, it is vital to consider how to construct and maintain benchmarks that align with the global goal of transitioning to net zero by 2050 or sooner, in line with global efforts to limit warming to 1.5°C.

As this paper points out, passive investors face uniquely prominent challenges when aiming to align their portfolios with net zero commitments while adhering to the composition of benchmarks that often disregard for such commitments.

Figure 1: Growth of passive investment



The weighting methods used in constructing broad equity market indices (e.g., market capitalisation weighting, price weighting, equally weighting, factor weighting) enforce capital allocation rules that often result in non-aligned portfolios. The Science-Based Target initiative (SBTi) reported in 2021 that four G7 country equity indices (which typically serve as benchmarks for equity strategies in the respective geographies) reflected temperature pathways of 3°C or higher.⁷ This is partly explained by the fact that fossil fuels are a significant contributor to emissions in all G7 country equity indices, a situation that is likely even more pronounced in some emerging markets where more liquid energy companies dominate the market index composition.

⁵ This paper uses both terms interchangeably. However, there is a subtle difference between the two. A benchmark is a customized standard of measurement used to evaluate the performance of an investment portfolio, while a market index is a specific type of benchmark that tracks the performance of a particular security market, market segment, or asset class. See the glossary for a full list of definitions.

⁶ Analysis by MSCI, excludes fund of funds and feeder funds

⁷ SBTi, 2021. No Major G7 Stock Index Aligned with Paris Climate Goals. <https://sciencebasedtargets.org/news/g7-stock-indexes-science-based-targets>

Similarly, broad bond market indices derive their composition from a series of eligibility criteria covering credit quality, duration, liquidity, seniority, among other characteristics, which do not usually include net zero commitments or corporate activity on climate. As a result, large portions of capital allocated to passive investments are not aligned with net zero targets.

Focus of the discussion paper

Investors are increasingly committed to aligning their portfolios with the goals of the Paris Agreement, guided by net zero targets, but a significant share of capital trading in public markets is allocated to strategies that track benchmarks that are inconsistent with such commitments.

The Net Zero Investment Framework provides a comprehensive basis for asset owners and asset managers to measure and manage portfolio alignment towards the goal of achieving global net zero emissions by 2050 or sooner, with no or low overshoot. NZIF is the most widely implemented methodology by institutional investors that are signatories to the Net Zero Asset Managers (NZAM)⁸ and Paris Aligned Asset Owners (PAAO)⁹ initiatives, the two net zero commitments and initiatives supported by IIGCC.

Overall, NZIF aims to assist investors to maximise their real economy influence in the net zero transition through four pillars: portfolio construction, management of real assets, engagement and stewardship, and selective divestment.

Currently, NZIF only provides high-level guidance for investors in benchmark products. It recommends that benchmarks and indices should reflect company performance against the alignment and transition criteria set out in the Framework, weighting in a way that incentivises benchmark constituents to align to net zero goals and increase revenues from climate solutions.

Relative to active managers, passive investment strategies and indexed funds have capital allocation constraints. Consequently, their journey towards net zero alignment requires a different approach and further guidance on how benchmarks can incorporate net zero targets is needed.

This discussion document seeks to provide a basis for analysis to strengthen the quality of benchmarks to facilitate net zero alignment for public market participants. It seeks to support investors to understand:

- How to overcome pertinent challenges to integrating net zero commitments into benchmark construction.
- What benchmark products exist for investors integrating net zero targets.
- How a benchmark can best contribute to the achievement of net zero objectives.
- How index providers can accelerate an investors' transition.



⁸ The Net Zero Asset Managers initiative

⁹ Paris Aligned Asset Owners

State of play – Net zero benchmarks and the EU Paris-Aligned Benchmark and Climate Transition Benchmark regulation

Attempting to implement multiple objectives into a single benchmark that strives to reflect the investable universe will inevitably involve trade-offs, leading asset managers and owners to balance multiple objectives with traditional risk/return considerations. Alternative benchmarks allow investors to explicitly consider alternative objectives, such as net zero alignment. The provision of meaningful net zero benchmarks to accelerate the alignment of capital invested in the public market with the net zero transition is crucial to achieving global climate change mitigation goals and reducing climate-related risks.

Index providers and asset managers have received increasing pressure from asset owners and civil society to boost 'sustainable investing' alternatives. To meet these demands, they are launching new products that incorporate a myriad of factors, and, in turn, alternative benchmarks are being designed to reflect the novel investment strategies. Regulation has a critical role to play in dictating the development and implementation of meaningful benchmarks that would truly unlock the role of financial capital in the transition to a low carbon economy.

EU Climate Benchmark Regulation

Regarding net zero benchmarks, the European Commission's regulation, introduced in 2019, has dominated the regulatory landscape. The regulations established Climate Transition Benchmark (CTB) and Paris Aligned Benchmark (PAB) standards¹⁰, stipulating conditions that benchmarks must meet to use these labels. These established a foundation on which future recommendations that further enhance real economy decarbonisation can be made. The EU Technical Expert Group on Sustainable Finance paper¹¹ states that ultimate goal of this regulation is Paris alignment, with a primary focus on emissions reductions.

Taking current emissions as the reference point, PABs and CTBs must achieve 50% and 30% emissions intensity reduction, respectively, compared to the "investable universe" – the broad universe from which the benchmark is derived. From that base, emissions intensity must continue to decline in line with the broad average required for the economy (7% annually) to meet the scientific estimates of the remaining carbon budget. Emissions intensity should be calculated using Enterprise Value Including Cash (EVIC) and should include Scope 3 emissions as per the phase in requirements listed below. The regulations differ slightly when applied to fixed income corporate instruments, where benchmarks can use GHG emissions calculated on an absolute basis for unlisted issuers, rather than based on GHG intensity. Notably, the regulation ruled out incorporating sovereigns given the state of available information.

As well as the emissions reductions criteria, other significant requirements need to be met for a benchmark to be branded with a PAB or CTB label:

- **Exclusions** – Required exclusions differ between CTBs and PABs. CTBs require the exclusion of companies involved in activities related to controversial weapons, the cultivation and production of tobacco and companies violating the UNGC principles or OECD guidelines. PABs require additional exclusions for companies involved in coal, oil, gas and highly intense energy production.
- **Sector control (Equity Exposure Constraint)** – For equities only, aggregated exposure to 'high climate impact' sectors (as defined by the European Commission, these are the sectors listed in NACE section codes A to H, and L) is required to be at least equal to that of the underlying investable universe. This is done with the intention that climate transitioning investors maintain their influence via engagement and voting, thus benchmarks meeting the Commission's criteria aim to prevent divestment out of 'high climate impact' sectors and maintain a realistic image of the real economy.¹²
- **Scope 3** – Scope 3 GHG emissions data for at least the energy, mining, transportation, construction, buildings, materials, and industrial sectors shall be included in the benchmark methodology. This expands to all asset classes by January 2025.

¹⁰ EU climate benchmarks regulations

¹¹ TEG final report on EU climate benchmarks and benchmark ESG disclosures – 30 September 2019 (europa.eu)

¹² Handbook of Climate Transition Benchmarks, Paris-Aligned Benchmarks and Benchmarks' ESG disclosures, 2019. https://finance.ec.europa.eu/sustainable-finance/disclosures/eu-labels-benchmarks-climate-esg-and-benchmarks-esg-disclosures_en

- **Disclosure** – Considering exclusively current emissions as the reference point for analysing a portfolio, PAB and CTB may increase the weight of issuers of constituents that set and publish GHG emissions reduction targets when:
 - ◊ The issuers publish Scope 1, 2 and 3 GHG emissions ‘consistently and accurately’
 - ◊ The issuers have reduced GHG intensity (or absolute emissions, where applicable) by 7% per annum for at least three consecutive years
- **Transparency** – Further requirements are stated for assurances of transparency, including transparency requirements for estimations, disclosures of the decarbonisation trajectory and accuracy of the data sources utilised. See the regulations for more information.¹³

Tools available to achieve objectives

To overcome the challenge of incorporating a net zero objective into benchmark investment strategies, index providers are implementing different approaches, with a range of objectives. Objectives such as accounting for:

- **Climate transition risks and opportunities:** These include benchmarks with the objective to protect investors against climate transition risks (i.e., reducing carbon beta), for example by selecting net zero aligned constituents, or by reducing the risk of exposure to stranded assets. Others have the objective to outperform traditional benchmarks by gaining exposure to the structural tailwinds produced by a low carbon transition, for example, by seeking greater exposure to companies investing in climate solutions.
- **Net zero and Paris alignment:** These are normative goals-based benchmarks, whereby the goal is to achieve a certain level of Paris alignment, defined by the Paris Agreement as limiting warming to well below 2C. As discussed later, this adds additional complexities, such as the way in which Paris alignment is defined (i.e., the carbon budget), and the way in which alignment is defined. To the latter, there are a multitude of possible approaches, such as defining a self-decarbonisation trajectory of the benchmark, utilising alignment criteria metrics to score benchmark constituents against the Net Zero Investment Framework’s alignment maturity scale, verified Science Based Targets, green revenues and capex, or a cumulative benchmark divergence metric (CBD)¹⁴, amongst others.¹⁵

A multitude of tools are at the disposal of index providers and investors when attempting to account for such objectives. Table 1 below provides an overview of these tools when benchmarks are being constructed and how engagement can be enabled when investing in benchmark products.



¹³ EU climate benchmarks regulations

¹⁴ IIGCC member briefing: Discussing a cumulative metric to improve the assessment of emissions targets – IIGCC

¹⁵ <https://assets.bbhub.io/company/sites/63/2022/07/GFANZ-Portfolio-Alignment-Measurement-August2022.pdf>

Table 1. Market environment: tools at the disposal of index providers and investors utilising benchmarks

| | Portfolio Construction | Engagement |
|--|---|---|
| Emissions Reducing <ul style="list-style-type: none"> • Decarbonisation Trajectory (PAB/CTB) • Transition Pathways | <ul style="list-style-type: none"> • Tilting • Optimisation • Tilts towards solutions (e.g., green revenue uplift) • Sector-based exclusions (e.g., ex-fossil fuels) • Rules-based exclusions (e.g., for constituents involved in fossil fuel financing) | <ul style="list-style-type: none"> • Promote adoption of net zero targets by investees • Voting/escalation policies |
| Low Carbon <ul style="list-style-type: none"> • Exclusion-based • Carbon Reduction Target (e.g., 30% lower than parent) • Broad ESG (e.g., ratings-based) | <ul style="list-style-type: none"> • Avoidance / divestment / debt denial • Tilting • Optimisation • “Best-in-class” or “leaders” | <ul style="list-style-type: none"> • Strategy dependent • Promote adoption of net zero targets by investees • Voting/escalation policies |
| Thematic | <ul style="list-style-type: none"> • Solutions-oriented • “Narrower” universe | <ul style="list-style-type: none"> • Solutions orientation potentially makes this less impactful |
| Market-based (i.e., standard benchmarks) | <ul style="list-style-type: none"> • Exposure-specific • Market-cap weighted • Blends of factors and ESG characteristics | <ul style="list-style-type: none"> • Materiality of risk focused with shareholder value orientation • Climate risk disclosures • Promote adoption of net zero targets by investees • Voting/escalation policies |

Portfolio construction and engagement

Early adopters in the space relied on outright exclusions and tilting methodologies, often extensively tailored by activity and with a range of revenue thresholds. More recently, the introduction of EU's CTB and PAB has resulted in more sophisticated products that incorporate carbon reduction through optimisation techniques. However, these do not always grant the transparency that is needed for constituents to understand the steps to be taken to be selected in the index. There are few examples in the market of providers incorporating granular carbon budgets into the construction methodologies, and it is still highly uncommon to see benchmarks that consider differentiated decarbonisation pathways across sectors and regions.

Index providers vary in their approach to incorporating data. For example, some integrate Scope 3 data into the index construction immediately, relying on sector averages and estimates, whilst others choose to avoid such inclusions due to data coverage and quality challenges. There is also a growing trend of incorporating forward-looking metrics such as Science Based Targets (SBT) into the construction process by tilting in favour of those corporates that have set credible SBTs. However, the extent to which targets can be used by index providers for PABs and CTBs is limited under the EU regulation. Additionally, most providers have a process for penalising corporates that have not disclosed data. This is likely to be easier in developed markets, where the regulation is more stringent, and firms have greater awareness and resources to invest in the net zero transition.

Some benchmarks facilitate engagement opportunities by informing their constituents on key climate issues that are being considered, or by implementing progressive criteria in the methodology to act as an escalation strategy. It is not always clear, however, how index providers are interacting with asset managers or asset owners to maximise engagement opportunities, or if they are applying differentiated strategies across asset classes. This is relevant because when it comes to opportunities for influencing the behaviour of issuers, there are fundamental differences among asset classes. While equity investors hold stock enabling them to engage (vote, resolutions, ask AGM questions), escalate (collective action, public statements, pre-declarations, propose directors), and, ultimately, divest, fixed income investors provide fresh funds to companies or governments, have important engagement leverage at the point of rebalancing, and do not have voting power.

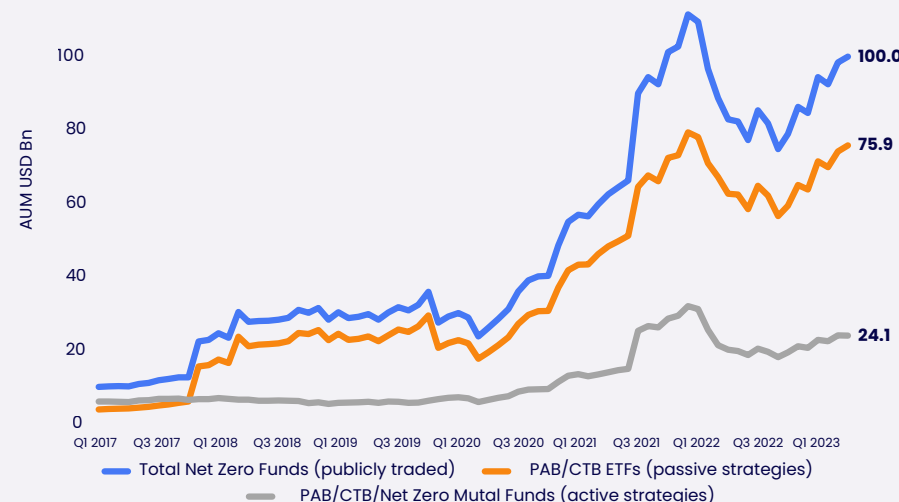
Table 4 in the Appendix shows an extensive list of net zero products available in the market, provided by the index providers that engaged with IIGCC's working group.

Growth of investment in net zero benchmarks

An increasing amount of investment is being channelled into products that track or seek to outperform net zero benchmarks. See Figure 2¹⁶. Since 2017, investment in net zero benchmark products has increased from approx. USD 10.2bn to USD 100bn in April, 2023. The over 9-fold rise has been largely driven by passive investment strategies such as PAB and CTB ETFs which accounted for approx. USD 76bn. This upward trend is expected to continue as pressure continues to grow on the investment community to comply with net zero commitments, to treat climate change risks as financial risks, and to tap into the opportunities stemming from the transition to a net zero future.

As noted earlier, regulation has a critical role to play in dictating the development and implementation of meaningful benchmarks that can unlock the role of financial capital in the transition to a low carbon economy. The EU climate benchmarks regulation described above has dominated investment into net zero benchmark products in recent years. ETFs meeting the criteria of the EU regulation make up a significant proportion of AUM of publicly traded funds incorporating net zero objectives. Hence, a robust regulation is key to foster desired real world outcomes.¹⁷

Figure 2: Growth of net zero benchmarks (listed equities and corporate bonds)



¹⁶ Analysis by MSCI

¹⁷ The gross majority of PAB/CTB strategies (85 out of 112) were launched in or after 2019, the year in which the EU regulation was published. A minority of funds were launched before the regulation and have updated their rules to comply with the EU regulation.

Assessment – First generation net zero benchmarks face a series of challenges

While it is to be welcomed that new financial products and benchmarks are embedding net zero objectives and incorporating climate science, some fall short of the commitments needed to achieve the goal of net zero emissions globally by 2050 or sooner. It is to be expected that the first generation of climate-related and net zero benchmarks will require adjustments, given that they face a multiplicity of additional challenges compared to traditional benchmarks. Below is a non-exhaustive list of some of the most prominent challenges.

Challenges facing net zero benchmarks

Climate data availability and quality – Climate data metrics integrated into benchmark methodologies will affect the weightings of the constituents. Harmonising vast amounts of data from multiple sources, filling data gaps when some data points are not available, ensuring data quality, ensuring the continuity and sustainability of climate data collection efforts, as well as data consistency, are all necessary additional actions that can often be cumbersome and expensive. As technology allows for greater data accuracy and availability, greater convergence is expected in the accepted metrics and sources used.

Complexities around forward-looking metrics – Closely related to the first point, emerging forward-looking metrics can help provide insight into the future decarbonisation of an index constituent; for example, by incorporating the potential effect of current actions, such as green capex investment and expressed future decarbonisation pathways. However, data coverage here is still limited as the empirical track record to provide supporting evidence is still insufficient. Similarly, companies' decarbonisation pathways expressed ex-ante might deviate from the reality ex-post, either because action was bolder or insufficient, and depending on the trajectory of the real economy the degree of tracking error can be expected to increase over time.

Taxonomy and evolving definitions – Benchmarks that incorporate guiding principles, such as 'Paris alignment' or 'net zero alignment' require a clear definition to be codified into their rules. This presents a complication because decarbonisation and alignment pathways are dependent on complex and not always compatible assumptions about policy, technology curves, and socio-economic factors over a long period of time at a global scale.¹⁸ Figure 4 in the Appendix shows the vast number of potential decarbonisation pathways that limit median warming to below 1.5C.

Furthermore, alignment rules and required rates of decarbonisations are expected to be evolving over time; incorporating such changes will increase the burden for both index providers and users of benchmarks.

Complexities around incorporating stewardship and engagement – A key lever in enacting change in the behaviour of a firm is for investors with voting rights to engage with them to effectively maximise their real economy influence on the transition to net zero. An important part of net zero benchmark design is to embed mechanisms that enable investors to utilise this influence.

As more and better technological tools emerge to address these challenges, net zero benchmarks should continue to improve. The same is true for regulation, which both influences and learns from market developments.

Assessment of the EU Climate Benchmark Regulation

Given the emergence of a multiplicity of financial products incorporating net zero objectives, and considering the complexities involved in meeting such commitments, the standards introduced by the EU Commission were an important step in the right direction. Climate Transition Benchmark (CTB) and Paris Aligned Benchmark (PAB) standards have provided a focal point for the decarbonisation effort, and they have helped popularise the notion that ongoing emissions reductions are critical rather than a nice-to-have.

Table 2 below describes some of the strengths and limitations of the regulation.

18 <https://www.abrdn.com/docs?editionId=8a4a2333-f0cf-4a9c-b87f-ae3040fc8ab5>

Table 2: Strengths and weaknesses of the EU climate benchmark regulation

| Positive aspects of the regulation | Areas to improve |
|---|---|
| <ul style="list-style-type: none"> • Importance of emissions reductions is emphasised as a critical goal. By concentrating attention on the need to ensure that there is an ongoing approach to cutting emissions, it stresses the importance of reducing companies' carbon emissions intensity (and absolute emissions where applicable). • Intends to prevent lower emissions being achieved simply by significantly underweighting high emission sectors (i.e., energy and mining). By dictating that the combined weight of 'high climate impact' sectors should be the same as for the broad universe from which the benchmark is derived. • Provided clarity into a market ecosystem where there was limited understanding of what respecting a carbon budget meant, and that rapid immediate actions are required to stay within it. In doing so, it prevented a "free-for-all" from gaining momentum in which it would likely have been difficult to assess the merits of competing approaches. | <ul style="list-style-type: none"> • Does not distinguish between organic emissions reductions versus those achieved by changes in the portfolio composition. Thus, emissions achieved by weighting changes and divestment are judged to be as valid as those achieved by changes in a company's practices and business model. In practice, several index providers reported that changes in weights played a primary role, both in equities and fixed income. • The emphasis of the regulations on current emissions rather than on future plans and commitments risks diminishing the efforts of investor engagement with companies in high emitting sectors. The structure of the regulation imposes a relatively slow change in weights relative to potentially greater ambition in some corporate targets, potentially disincentivising bold corporate action and reducing the influence of investor engagement. • Particularly for companies operating in high emitting sectors, there remains large scope for capital to be misallocated as a result of index weights changing purely due to volatility in the denominator rather than in a company's emissions. Whilst the use of enterprise value including cash (EVIC) poses some advantages, such as alignment with PCAF¹⁹ and the Net Zero Investment Framework's Target Setting Guidance²⁰, there are inevitable complications. • The regulations do not incorporate a link with the taxonomies that are evolving to incentivise scaling up investment in climate solutions or enabling activities critical to the transition. |

¹⁹ <https://carbonaccountingfinancials.com/en/standard>

²⁰ https://www.iigcc.org/media/2021/12/NZIF_IIGCC-Target-Setting-Guidance.pdf



Some of these points can lead to unfortunate unintended consequences.

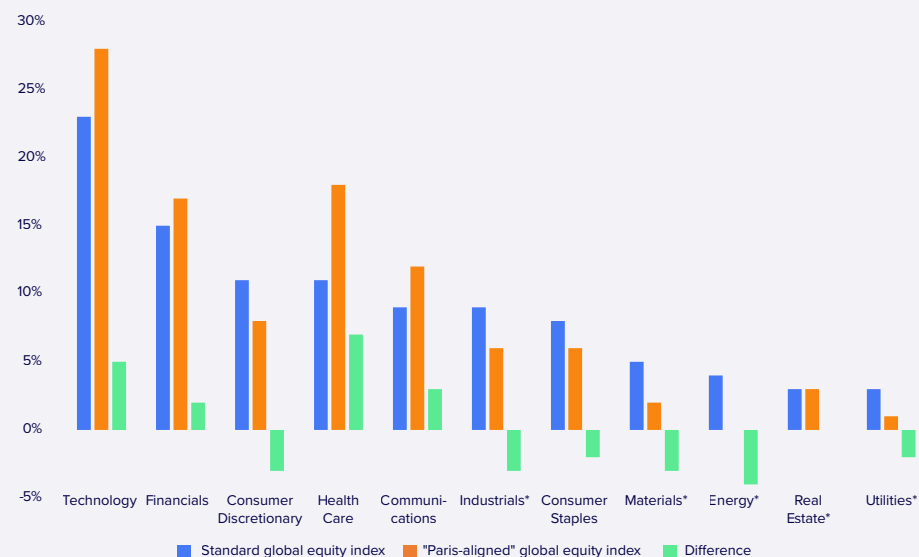
Given that there is a wide disparity in the emissions intensity among companies within the same sector, as well as among sectors within the 'high climate impact' group, it is possible to achieve seemingly high emissions intensity reductions with minimal changes to capital allocation. For example, for a given global equity index, excluding the top 50 emitters (measured in terms of absolute Scope 1 and 2 emissions) can roughly halve the total carbon footprint of the index. Excluding the top 100 high intensity emitters (measured as total emissions relative to sales), which represent only 3% of the index weight, has a similar impact on the carbon intensity of the overall index.²¹

Following the regulation, it has become apparent that benchmarks complying with the regulations tend to overweight less material sectors to climate change, such as communications, technology and health care (see Figure 3). The benchmarks also reallocate to the lowest emitting sectors within the group of industries defined as 'high emitters'²² in the regulation, away from the energy sector which sees the largest reduction in capital allocation (4% from the investable universe – see Table 3 in the Appendix for a full breakdown of sectoral allocations).²³

This trend of sectoral bias is at odds with two important dynamics of the transition: that today's high carbon companies may be deploying capital toward tomorrow's low carbon technologies, and that investor influence can support these companies in decarbonising at the necessary pace. In other words, there is a risk of 'hitting the target whilst missing the mark'.

Furthermore, if the goal of climate benchmarks is to provide 'a realistic image of the real economy'²⁴, a degree of flexibility should be encouraged; for instance, by incorporating differentiated regional and sectoral pathways. Several index providers that engaged with the working group expressed a concern that regulation has partly reduced index innovation in the industry, as participants compete to deliver variations on a subset of products with specifications known in advance.

Figure 3: Sector breakdown of a standard global equity index vs a 'Paris Aligned' version



²¹ <https://www.fulcrumasset.com/inst/uk/en/fulcrum-blog/the-carbon-half-time-show/>

²² * Shows the index sectors compatible with the "high climate impact" sectors as defined by the EU Low Carbon Benchmark Regulation based on NACE codes from A to L.

²³ [fulcrum-the-tracking-error-error-why-climate-alignment-calls-for-bolder-steps.pdf](#) (fulcrumasset.com)

²⁴ Commission Delegated Regulation (EU) 2020/1818, Art. 6

Conclusion – Towards an enhanced generation of net zero benchmarks

As discussed above, the current regulations have room for improvement to enable greater efficiency in the next generation of net zero benchmarks. Index providers and their users can also innovate to further improve and close gaps in critical areas. Advances in the following areas will allow for better nuance in benchmark construction.

- **Engagement** – Innovation is encouraged in expanding engagement opportunities that drive corporate behaviour change. Greater collaboration among index providers, users, and regulators is needed to maximise engagement opportunities, and to better understand how benchmarks can facilitate differentiated engagement opportunities across asset classes.
- **Additional asset classes** – Further work is required in incorporating additional asset classes into net zero benchmarks, as well as designing differentiated approaches for existing asset classes. The regulations have yet to explore methodologies for sovereign bond benchmarks, whilst offerings amongst index providers for fixed income in general is limited. As better data becomes available on this front, through initiatives such as PCAF and ASCOR, net zero benchmarks should innovate accordingly.
- **Sectoral, regional, and temporal nuance** – Net zero benchmarks should strive for better sectoral, regional, and temporal nuance. In a global context, sectoral classification disregarding for regional disparities is likely to introduce biases, and it is likely to be disadvantageous to emerging market countries where transition financing needs are elevated. While the EU climate benchmark regulation specifies that a fixed decline in emissions intensity relative to the investable universe should be achieved at any point in time the optimal relationship is likely to be dynamic rather than static.
- **Forward-looking metrics and climate solutions** – Innovations that help consider future decarbonisation pathways, incorporate climate solutions, and products such as green and sustainability-linked bonds, may offer scope for more substantial deviation from the approach used to construct traditional bond indices.

It is important that net zero benchmarks are not boxed into a single definition but rather have room to account for investor objectives and innovation. Regardless of whether an investor is seeking active or passive investment products, the benchmark or index selection is an active decision of the investor client. Should a client wish for factors such as net zero commitments to be reflected in their choice of benchmark, it is crucial to make a distinction on the precise objective of the client and to reflect these into a well-designed benchmark.



What should a net zero benchmark look like?

Here, we outline a set of recommendations that would enable benchmarks to better contribute to real world decarbonisation, derived by our working group. The group prioritised five broad principles that they agreed should be integrated into the construction, maintenance and reporting processes of equity and corporate bond net zero benchmarks. Regardless of the investor's objectives, the working group views these characteristics as implementable. The principles see considerable overlap with the principles outlined by the Net Zero Asset Owner Alliance's call to action for asset owners and index providers²⁵, and provides more specific recommendations to support the application of the principles.

The principles are intended to be implementable across asset classes as high-level guidance. However, index providers and investors should be wary of nuances between the asset classes, for example when it comes to engagement and the approach to exclusions. A differentiated approach to exclusion/divestment may be granted for corporate fixed income investments, and just transition concerns would be relevant when investing in sovereign bonds. As was pointed out earlier, to date, significantly less progress had been made in fixed income net zero benchmarks, and in particular for sovereign bonds, which limits the scope of this paper.

Designed to enhance real world decarbonisation efforts, the first principle is overarching, with the succeeding principles aiming to enable this primary objective. Therefore, there is considerable overlap between this principle and the other principles.

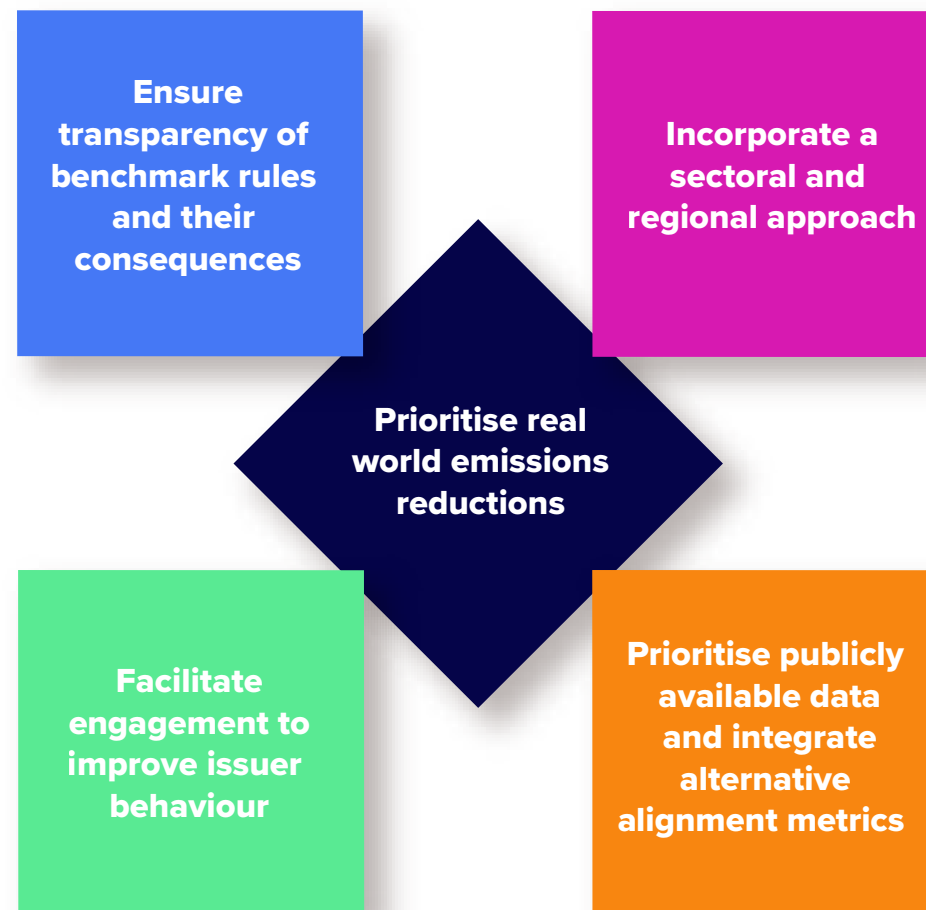
In summary, the broad principles are:

- 1. Prioritise real world emissions reductions**
- 2. Ensure transparency of benchmark rules and their consequences**
- 3. Incorporate a sectoral and regional based approach**
- 4. Prioritise publicly available data, integrating alternative alignment metrics**
- 5. Facilitate engagement to improve issuer behaviour**

Collaboratively, the principles and more specific recommendations listed below will enable benchmark products to have the real world impact they need to have for an orderly transition to net zero.

The recommendations are compatible with the Net Zero Investment Framework, aiming to encompass real world emissions reductions: the primary motivation of the NZIF.

Following identification of the principles, IIGCC reached out to the index providers who had engaged with the working group, most of whom responded with their views on the feasibility of implementation of such recommendations, as well as indicating to what extent they felt the recommendations were already integrated into their processes. These views are also documented below.



²⁵ [NZAOA_Development-and-Uptake-of-Net-Zero-Aligned-Benchmarks.pdf \(unepfi.org\)](#)

1. Prioritise real world emissions reductions

A critical feature of achieving net zero is for the economic system as a whole to adapt. The IIGCC working group considers it important to set out the role investors can play in the different strategies they engage in. Although different investors will ascribe different levels of importance to how closely an index performs relative to a parent universe; the extent to which it avoids potential stranding risk; how frequently it turns over, etc., having clarity over the relationship between emissions reductions ascribed to a paper portfolio and those achieved in the real economy is essential for a net zero benchmark.


The working group has identified the following recommendations:

- Net zero benchmarks can have their greatest real economy impact when they adopt a process based on emissions reductions in the real economy, i.e. where the dominant influence comes from organic declines in emissions or allocating capital to industry best performers rather than 'declines on paper', which stem purely from weighting changes that result in inter-sector reallocations.
- Enhancing real world impact entails having a framework that is formally based on a carbon budget and extends beyond current emissions to incorporate targets, as the following principles lay out in more detail.
- Benchmarks that facilitate engagement with constituents are highly desirable to enhance real world decarbonisation.

- Index providers should publish attribution analysis to understand how the emissions reductions are being derived from the investable universe, explaining the contributory effects from sources such as organic 'real-world' reductions, benchmark divestment and reweighting effects, EVIC or sales-based intensity influences or other sources; the results should be compared with the objectives set out for the index.

Index provider views: Most index providers felt that there are approaches that enhance real world decarbonisation in superior ways to others, and that robust innovation can provide opportunities for investors seeking real world impact. Whilst there was a slight concern from a small number of index providers regarding the feasibility for implementation of such a principle in the current market, there was significant support for the intention and a clear willingness to work towards the ambition. All recognise that emissions reductions stemming purely from sectoral shifts is undesirable.

The index providers saw the recommendations as being at least partially incorporated into their own practices, however, they agreed there are areas for improvement.



**Prioritise real
world emissions
reductions**

2. Ensure transparency of benchmark rules and consequences

The importance of transparency is clear across most aspects of the operation of a net zero benchmark, and the potential consequences of any specific design should be highlighted to investors. For investors targeting a net zero objective, it is critical that a benchmark being tracked should deliver on that objective, meaning clarity on the benchmark's objectives and proposed mechanisms for achievement is of significant importance. Undoubtedly, improvements can and need to be made in this respect, as outlined by the FCA in a firmly worded letter to benchmark administrators upon review of ESG benchmarks.²⁶

Specifically, the IIGCC working group makes the following recommendations:

- Provide clarity over how the benchmark's operation will lead to the selection of assets, their weighting within the index as well as how the index aligns with the net zero objective; further disclose the consequences of the approach for portfolio characteristics such as tracking error, concentration and turnover in various real-world scenarios. The effects of any optimisation process used should be published each year.
- Publish attribution analysis to understand how the emissions reductions are being derived from the investable universe, as per the first principle, explaining the contributory effects from sources such as organic 'real-world' reductions, benchmark divestment and reweighting effects and EVIC or sales-based intensity influences or other sources, clearly distinguishing changes due to numerator and denominator. The results should be compared with the objectives set out for the index. An example of attribution analysis is provided in the Appendix, Figure 5.
- Describe index construction rules and constraints, highlighting key features that may be unique such as the importance of decarbonisation starting references and nuances of intensity calculation approaches.
- Benchmarks should be transparent about the process used for companies in each sector and how relative sector weights are established; regardless of whether the benchmark is constructed relative to an existing index, the impact of weighting choices on sector and country exposure relative to a parent universe should also be reported each year.

Index provider views: The providers agreed with the working group that transparency is critical to allow investors to make informed decisions and achieve their net zero objective. They felt these recommendations were at least partially incorporable into a benchmark's construction, maintenance and reporting processes. Most providers viewed all the recommendations as practicable, with the main concerns arising around the resources and complexity of attribution analysis.

All of the providers that responded saw the recommendations as being at least partially integrated in their respective practices, through the public disclosing of index construction methodologies as well as complementary reports and research projects. A limited number viewed all of the recommendations as being integrated into their practices.

**Ensure
transparency of
benchmark rules
and their
consequences**

²⁶ FCA outlines where improvements are needed in ESG benchmarks | FCA

3. Incorporate a sectoral and regional approach

A one-size-fits-all-approach to emissions reductions is not judged by the working group to represent best practice. Sector based pathways that recognise variability across economically important sectors and regions is inherent for an optimal net zero transition. This may further facilitate stewardship and engagement actions in the long term and ensure that capital markets support best-in-class high carbon participants. The working group recognised the added complexity behind incorporating sectoral and regional decarbonisation pathways into benchmarks, emphasising the importance of transparency.

The working group recommends the following:

- When determining index weights, the working group judges it to be best practice for benchmarks to assign different emissions reductions pathways for different sectors, incorporating carbon budgets.
- Recognising the lack of sector-specific regional pathways, benchmarks should nevertheless integrate regional considerations where possible and phase in as coverage and quality improves. Investors should engage with pathway providers to improve the regional granularity of pathways.
- It is critical to distinguish high-emitting sectors from other parts of the economy, as well as emerging markets from developed countries, defined as sectors in NACE code categories A-H and J-L in the Net Zero Investment Framework.²⁷
- The working group advocates that index providers use publicly available sector and country benchmarks to ensure that investors can use the index construction approach as part of their engagement with companies and sovereigns, such as those available from TPI.

- The base year for assessing the carbon budget when constructing the index should be made clear.
- Benchmarks should be transparent about the process used for companies in each sector and how relative sector weights are established.
- For complete transparency, index providers should provide a clear methodology for:
 - ◊ How the carbon budget used in the benchmark is established
 - ◊ Which data sources are used
 - ◊ Which metrics are used to evaluate companies' or sovereigns' performance
 - ◊ The basis on which the budget is allocated to different entities

Index provider views: The index providers were highly supportive of incorporating sectoral and regional-specific pathways into a benchmark's construction, with the majority viewing all of the recommendations as feasible for implementation. There was acknowledgement that there are some limiting factors in the context of pathway availability, granularity and standardisation.

Despite the support for the integration of such pathways, the number of index providers actually incorporating these into a benchmark's construction was limited, with most suggesting they only partially followed the recommendations outlined above. There was recognition that the EU climate benchmark regulations limit the opportunity to apply the recommendations.

**Incorporate a
sectoral and
regional approach**

²⁷ [Net_Zero_Investment_Framework_final.pdf \(parisalignedassetowners.org\)](#)

4. Prioritise publicly available data and integrate alternative alignment metrics

While absolute emissions reductions are essential, a range of alternative metrics are available that better reflect transition potential and enhance real world emissions reductions. Investors and index providers should consider the value of integrating these metrics into the construction and maintenance processes of benchmarks, while maintaining a transparent approach.

The working group therefore recommends the following:

- For transparency, the methodology should prioritise publicly available data and be replicable, outlining the sources used, encompassing full PCAF-aligned reporting and include data quality scores. The limitations of the data used and risks of data available should be described, and if relying on intensity metrics using EVIC or WACI, the difference between emissions reductions on this metric and the change in absolute emissions should be published.
- Data points that reflect the ten alignment criteria set out in the Net Zero Investment Framework should be considered for integration into the construction of benchmarks to recognise constituents that are leading the transition, utilising TPI, SBTi and Climate Action 100+ data.²⁸ Further support for identifying alignment data points is available in IIGCC's data catalogue.²⁹
- Forward-looking metrics should be incorporated into the construction process. Specifically, Science Based Targets or equivalent assessed against sector-specific pathways, indicating the ambition of entities.
- Green capex, and other metrics indicating to what extent the constituent is providing investment in climate solutions and enabling activities such as green revenue, should be considered for incorporating into the construction of a benchmark. This is particularly relevant for corporate bond benchmarks, given that bond markets are more likely to be the providers of working capital to facilitate capex for the transition.
- Where companies' or sovereigns' commitments to reduce future emissions are included in the weighting process, index providers should set out how future weights will vary depending on entities' performance relative to their prior commitments.
- The index provider should set out whether companies not reporting emissions are penalised in the weighting process.
- To improve the alignment of a benchmark, investors and providers should consider the incorporation of a Cumulative Benchmark Divergence Metric, explained in a recent IIGCC paper.³⁰

Index provider views: Once again, the index providers that responded to the proposed recommendations were highly supportive and viewed them as feasible for implementation. The prioritisation of publicly available data was welcomed to enhance convergence and transparency amongst providers. A slight concern was raised regarding the data availability that maps across to the Net Zero Investment Framework's alignment criteria, however it was recognised improvements are being made in this respect.

Most providers see their practices as at least partially incorporating the recommendations and plan to incorporate some of the principles as data quality and coverage improves, particularly green capex which is currently limited.

Prioritise publicly available data and integrate alternative alignment metrics

²⁸ [Net_Zero_Investment_Framework_final.pdf \(parisalignedinvestment.org\)](#)

²⁹ [IIGCC-Data-Service-Providers-Catalogue.pdf](#)

³⁰ [IIGCC member briefing: Discussing a cumulative metric to improve the assessment of emissions targets – IIGCC](#)

5. Facilitate engagement to improve issuer behaviour

For net zero indices following a carbon reduction pathway, the working group acknowledged that, to an extent, a gap exists between portfolio decarbonisation and real-world outcomes. This has been the subject of much industry debate and increasingly, the value of stewardship and engagement, and the importance of capital provision for carbon intensive sectors is being recognised.

Whilst the choice of any individual investor to divest may be considered to be appropriate in certain types of optimised pathway strategies, further innovation can provide solutions to enhance engagement, which can improve corporate behaviour and, crucially, enable emissions reductions in the real economy. Thus, facilitating engagement is crucial in improving the level of alignment on the Net Zero Investment Framework's maturity scale set out in the Target Setting Guidance.³¹

The working group identified the following recommendations:

- Investors and index providers should engage with existing and potential constituents of a benchmark to explain climate-related signals embedded into the index methodologies with the aim of improving corporate behaviours. This is particularly important for fixed income indices, for both corporates and sovereigns, which are on the edge of inclusion in the index. Investors and index providers should report on these engagement strategies, including any significant outcomes from the engagements.

- Metrics that align particularly well with engagement strategies should where possible be incorporated into construction methodologies, particularly data points that can be mapped across to the alignment criteria outlined in the Net Zero Investment Framework.³² For instance inclusion criteria, especially for high-emitting sectors; or weighting systems that favour companies using science-based targets; assessment relative to a carbon budget from a recognised provider, such as TPI or SBTi, that aligns with a net zero objective; and the favouring of companies with reported emissions data versus those for whom it has been estimated.
- Implementing progressive criteria that utilises the data points suggested above can act as a default escalation strategy. For example, integrating the Net Zero Investment Framework's alignment maturity scale to enable appropriate selective divestment decisions. This should be considered as an area for innovation amongst index providers.

Index provider view: For the final principle, the intention of facilitating engagement was favourable amongst the providers. There was particularly strong support for embedding signals within the construction methodology which increase investors' ability to engage with and increase effectiveness of engaging with constituents. Several responses suggested that providers view their actions as limited, and that the primary impact from engagement came from the actual owners of the capital. However, there was some support for index providers to engage directly with potential constituents, with the view that, like other financial market participants, index providers have a role to play to improve climate performances.

The majority of index providers view their current practices as encompassing the recommendations at least partially, primarily through the inclusion of data in construction methodologies which act as signals to and facilitate investor engagement with (potential) constituents of the benchmark.

**Facilitate
engagement to
improve issuer
behaviour**

³¹ NZIF_IIGCC-Target-Setting-Guidance.pdf

³² Net_Zero_Investment_Framework_final.pdf (parisalignedassetowners.org)

Appendix

Table 3: Sector breakdown of a standard global equity index vs a 'Paris Aligned' version

| Sector breakdown by weight | Standard global equity index | 'Paris-aligned' global equity index | Difference |
|----------------------------|------------------------------|-------------------------------------|------------|
| Technology | 23.0% | 28.0% | 5.0% |
| Financials | 15.0% | 17.0% | 2.0% |
| Consumer Discretionary | 11.0% | 8.0% | -3.0% |
| Health Care | 11.0% | 18.0% | 7.0% |
| Communications | 9.0% | 12.0% | 3.0% |
| Industrials* | 9.0% | 6.0% | -3.0% |
| Consumer Staples | 8.0% | 6.0% | -2.0% |
| Materials* | 5.0% | 2.0% | -3.0% |
| Energy* | 4.0% | 0.0% | -4.0% |
| Real Estate* | 3.0% | 3.0% | 0.0% |
| Utilities* | 3.0% | 1.0% | -2.0% |

Figure 4: IPCC AR6 pathways – different rates of decarbonisation required

2019 – 2030 Decarbonisation % vs Median Warming in 2100

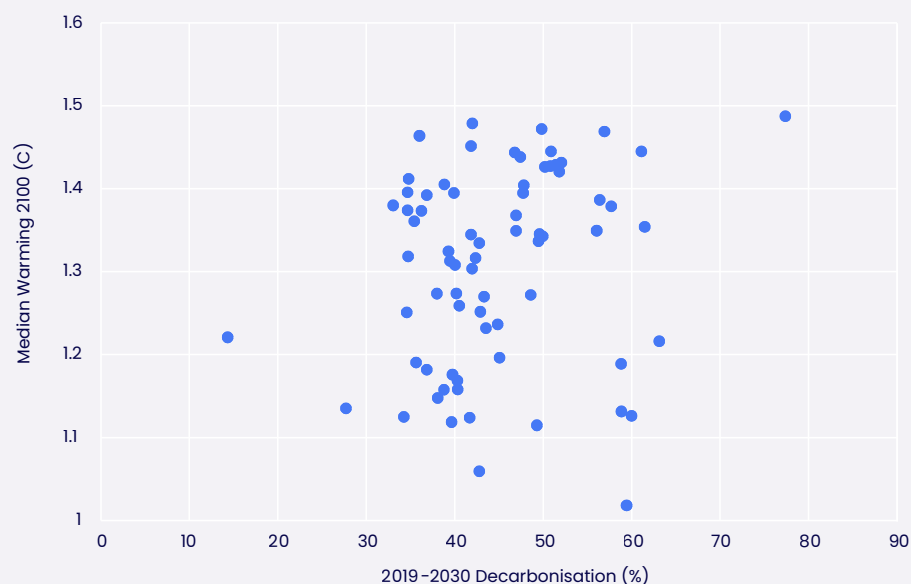


Figure 5: Attribution analysis, Scientific Portfolio³³



³³ This figure is an illustration of the possible outputs of a decomposition model proposed by the EDHEC Business School's newest venture Scientific Portfolio. The model makes it possible to distinguish between five factors that influence changes of greenhouse gas emissions of an equity portfolio over time: sector allocation (weight of a given sector in portfolio), intra-sectoral allocation (weight of a stock in the sector), emissions intensity of the firms (expressed as tons of CO₂e per million dollars of sales), sales and market capitalisation. This illustrative figure is based on the analysis of a climate impact index over the period 2014-2019; the absolute emissions correspond to the greenhouse gas emissions in TCO₂e (tons of CO₂ equivalent) for 1 million dollars invested in the instrument. The decomposition shows that the climate impact index achieves its decarbonisation mainly through organic emissions intensity reductions and intra-sectoral allocation, which confirms the ability of the index to reduce its absolute emissions while limiting sector exposure bias.

Table 4: Eight index providers' net zero offerings³⁴

| Index provider | Indices | Asset class | PAB/CTB? | Core characteristics |
|---------------------|---|---------------------------|----------|---|
| Bloomberg | Bloomberg Paris-Aligned & Climate Transition Indices | Equities/ Corporate bonds | PAB/CTB | <ul style="list-style-type: none"> Aims to reflect the technical requirements as set out in the Delegated Act Equities: applies rules-based / optimised constraints to comply with minimum requirements and semi-annual rebalancing Fixed income: Applies a rules-based, exclusion approach to achieve decarbonisation trajectory with monthly rebalancing. |
| Bloomberg | Bloomberg MSCI Paris-Aligned & Climate Transition Indices | Corporate bonds | PAB/CTB | <ul style="list-style-type: none"> Designed to meet and exceed the minimum PAB/CTB standard Achieves the target decarbonisation while minimising tracking error volatility and implementing optimisation constraints for duration, yield, and sector exposures, including overweighting companies with credible emissions reductions targets Does not exclude issuers with aggressive emissions reductions targets, or those that are carbon transition solution providers. |
| Bloomberg | Bloomberg Government Bond Carbon Scored Indices | Sovereign bonds | N/A | <ul style="list-style-type: none"> The series reweights all index-eligible issuers by adjusting market value weights according to their Climate Risk Score, increasing allocation to countries that score higher, relative to their peers, on specific climate-related issues Bloomberg's Government Climate Risk Scores measures a country or region's progress in meeting the temperature rise and climate goals set out in the Paris Agreement on a 0-10 scale, with 10 being best The indices do not include one type of index or methodology, but a group of alternative weighting methodologies applicable to any Bloomberg Government Bond Index, including both standard and custom indices. |
| FTSE Russell | FTSE Global Climate Index Series | Equities | No | <ul style="list-style-type: none"> Designed to reflect the performance of a global and diversified basket of securities where their weights are varied based on three types of climate-related factors (carbon emissions, fossil fuel reserves, and green revenues data) Aims to maintain similar risk/return characteristics to the underlying universe. |
| FTSE Russell | FTSE TPI Climate Transition Index Series | Equities | No | <ul style="list-style-type: none"> Objective is to consider past- and forward-looking trends, and favour constituents that are positioned to prevail in a low carbon economy thus supporting effort to address climate change. Adjusts market capitalisation weights based on the level of greenhouse gas (GHG) emissions, green revenues, fossil fuel reserves, climate governance score (TPI MQ), carbon performance score (TPI CP) Companies with targets that are not aligned with a scenario of 2 degrees or below 2 degrees warming, or a country's NDC plan are scored at zero but are eligible for re-entry into the index once their targets improve. |

³⁴ Please note the descriptions of net zero offerings in the market have been provided by the index providers

| | | | | |
|-------------------------|--|-----------------|---------|---|
| FTSE Russell | <u>FTSE EU Climate Benchmark Index Series</u> | Equities | PAB/CTB | <ul style="list-style-type: none"> Objective is to align with regulatory objectives, capturing the goals of the Paris Agreement whilst reflecting the performance of the parent index Adjusts market capitalisation weights based on the level of GHG emissions, green revenues, fossil fuel reserves, climate governance score (TPI MQ), carbon performance score (TPI CP) in line with minimum standards of EU Low Carbon Benchmark regulation Scope 3 GHG emissions data incorporated on an ongoing basis in line with regulation. |
| FTSE Russell | <u>FTSE Climate Risk-Adjusted Government Indexes</u> | Sovereign bonds | N/A | <ul style="list-style-type: none"> Objective is to allow sovereign bond investors to consider climate change risks in their investment portfolios Monthly market value weights are tilted by annual country climate scores to improve exposure to climate risks while minimising tracking error Climate risk quantitatively assessed on physical risk, transition risk and climate resilience The 'advanced' solution variant of the index aims to maximise environmental benefits without tracking error constraints or targets by increased powers on tilts. |
| FTSE Russell | <u>FTSE Green revenue Index Series</u> | Equities | No | <ul style="list-style-type: none"> Aims to reflect performance of global companies engaged in the transition to a green economy, capturing changes in revenues derived from green goods, products and services Companies are analysed and categorised using the FTSE Green Revenues Classification System (tiers 1 + 2) Eligibility in the indices depends on the portion of green revenues as classified by the FTSE Green Revenues Classification System to total company revenue Indexes within the series weighted either by Market Capitalisation or tilting according to percentage eligible revenues, with capping. |
| FTSE Russell | <u>FTSE Environmental Markets Index Series</u> | Equities | No | <ul style="list-style-type: none"> Series measures the performance of global companies that have significant involvement in environmental business activities and the green economy. Split into two sets: <ul style="list-style-type: none"> Environmental Opportunities Indexes – Measures the performance of a range of companies that have significant involvement in environmental business activities (>20% exposure to tiers 1+2 Green Revenues). Environmental Technology Indexes – Measures the performance of pure play companies whose core business is in the development and deployment of environmental technologies (>50% exposure to tier 1 Green Revenues) Some indexes divided by Green Revenue Sector, others by region. Each series also includes "Top 100" variant including largest 100 eligible companies by market capitalisation. |
| ICE Data Indices | <u>Government Carbon Reduction Indices</u> | Sovereigns | N/A | <ul style="list-style-type: none"> Objective is to minimise the estimated tracking error versus the parent index Uses optimisation process to tilt weights of constituent countries to lower the weighted average carbon footprint of the overall index Constraints of the index include maximum and minimum bond weights of 500% and 20% respectively, index duration within +/- 0.25 of the parent index, maximum country weight = 50%, index carbon metric initially set to 20% target reduction relative to the parent index Information used based, in part, on CO2 per capita (EDGAR Carbon Data Report). |

| | | | | |
|-------------------------|---------------------------------------|--------------------------|-------------|---|
| ICE Data Indices | <u>Corporate Climate Indices</u> | Corporate bonds | PAB/CTB/No | <ul style="list-style-type: none"> Two PAB variants, two CTB variants and two 'Net Zero' variants not meeting EU regulation (by using revenues to measure emissions reductions) Non-EU regulatory variants have targets of 7% y-o-y emissions reductions; Excl. fossil fuel variant must be at least 50% the carbon level of the parent index, whilst the other must be at least 30% below The index carbon reduction is met by applying weighting tilt factors to constituents ranked based on their relevant carbon metrics, adjusting weights based on market capitalisation All include basic ESG exclusionary filters (i.e., emissions disclosures, controversial weapons/tobacco, DNSH). Three variants include an additional filter targeting certain fossil fuel-related business involvements. |
| MSCI | <u>Climate Change Indexes</u> | Equities/Corporate bonds | CTB-aligned | <ul style="list-style-type: none"> Objective is to represent the performance of the parent index whilst re-weighting based on opportunities and risks associated with the transition to a lower carbon economy, while minimising exclusions and exceeding the minimum standards of the EU CTB criteria Emissions reduction targets captured in MSCI's Low Carbon Transition score Underweight companies facing higher transition risk, maintain higher green/fossil fuel revenue ratio than the parent, overweight companies providing solutions. |
| MSCI | <u>Paris-aligned Indexes</u> | Equities/Corporate bonds | PAB | <ul style="list-style-type: none"> Aims to address climate change in a holistic way, reducing exposure to physical and transition risks and increase exposure to sustainable opportunities while exceeding the minimum standards of the EU PAB and incorporating TCFD recommendations. Designed to reduce its GHG intensity by 10% every year; achieved through re-weighting and selection of companies during rebalancing, using MSCI's Climate Value-at-Risk Optimisation parameters target an increased weight for companies based on their Low Carbon Transition Score (+10%), emission reduction targets (+20%) and green revenues (x4/100% minimum increase). |
| MSCI | <u>Climate Action Indexes</u> | Equities | No | <ul style="list-style-type: none"> Designed to represent the performance of companies that have been assessed to lead their sector peers in terms of their positioning and actions relative to a climate transition Select top 50% of companies by count in each GICS sector based on emissions intensity for scopes 1, 2 and 3, science-based targets, risk management and green revenues. |
| MSCI | <u>Low Carbon Indexes</u> | Equities | No | <ul style="list-style-type: none"> Intended to help identify potential risks associated with the transition to a low carbon economy while representing the performance of the broad equity market, addressing carbon emissions and fossil fuel reserves Low Carbon Target Indexes re-weights stocks based on their carbon exposure in the form of carbon emissions and fossil fuel reserves Low Carbon leader indexes aim to achieve at least 50% reduction in the carbon footprint of the parent by excluding companies with the highest carbon emissions intensity and the largest owners of carbon reserves whilst minimizing the tracking error relative to their parent index. |
| MSCI | <u>Fossil Fuels Exclusion Indexes</u> | Equities | No | <ul style="list-style-type: none"> Developed for use by institutional investors who aim to eliminate or reduce some or all fossil fuel reserves exposure from their investments The two variants, Ex Fossil Fuels Index and Ex Coal Index, have specific screening criteria and are free float-adjusted market capitalisation weighted. |

| | | | | |
|----------------|---|-----------------|---------|--|
| MSCI | Global Environment Indexes | Equities | No | <ul style="list-style-type: none"> Designed to maximize exposure to environmental impact themes by including companies that focus on offering products or services that contribute to a more environmentally sustainable economy by making a more efficient use of limited global natural resources Companies deriving 50% or more of their revenue cumulatively from the six Environmental Impact themes are eligible for the index based on their level of involvement and strategic commitment to the six environmental themes. |
| MSCI | Climate Transition Corporate Bond Indexes | Corporate bonds | CTB | <ul style="list-style-type: none"> Aims to re-weight securities by reducing exposure to absolute greenhouse gas emissions, absolute potential absolute emissions, and weighted average “Green Revenues” to weighted average “Fossil fuel-based Revenues”. These indexes exceed the minimum standards of EU CTB Emission reduction targets (30%), annual emission reduction target (7%), at least equivalent ratio of Green Revenue/ Fossil fuels-based Revenue. |
| Qontigo | STOXX Low Carbon Series Section 13.4 of Qontigo’s rulebook | Equities | No | <ul style="list-style-type: none"> Designed to help investors decarbonise their portfolios and limit the exposure to climate-related risks Carbon-tilt overweights low emitters and underweights high emitters; Price weighted – free-float market cap multiplied by the corresponding Z-score carbon intensity factor of each constituent Excludes coal and penalises stocks with missing data. |
| Qontigo | STOXX Climate Change Series Section 13.5 of Qontigo’s rulebook | Equities | No | <ul style="list-style-type: none"> Incorporates the CDP climate change scoring methodology which evaluates companies based on progress in the transition towards low carbon economy Three categories: Climate Awareness, Climate Impact, Climate leaders. |
| Qontigo | STOXX EU Climate Benchmarks Section 22 of Qontigo’s rulebook | Equities | PAB/CTB | <ul style="list-style-type: none"> Encourage climate stewardship and corporate engagement to meet carbon reduction goals CTB aims for 40% GHG intensity reduction, PAB aims for 60% intensity reduction Scope 3 data used from inception Both CTB and PAB baseline exclusions are for companies that fail: <ul style="list-style-type: none"> Global Standards Screening Controversial weapons Tobacco producers (0% revenue threshold) Significant obstruction to the UN Sustainable Development Goal (SDG) <ul style="list-style-type: none"> 12, Responsible Consumption and Production 13, Climate Action 14, Life Below Water 15, Life on Land ESG Controversy Rating of Category 5 (Severe) (as identified by Sustainalytics) PAB imposes additional activity exclusions as well. |

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| Qontigo | STOXX Climate Transition Risk Section 14.16 of <u>Qontigo's rulebook</u> | Equities | No | <ul style="list-style-type: none"> Leverages WTW's proprietary Climate Transition Value at Risk data, assessing the anticipated impact of a climate transition on company valuations through forward-looking, bottom-up analysis Securities screened for sustainability criteria using Global Standards Screening, Controversial Weapons, Thermal Coal and Oil Sands Weighted by free-float market cap adjusted for Climate Transition Value-at-Risk with individual constituents, industry and country constraints applied. |
| S&P Global ³⁵ | <u>S&P Net Zero 2050 Paris-Aligned and Climate Transition (PACT) Indices</u> | Equities | PAB/CTB | <ul style="list-style-type: none"> Indices align with EU Low Carbon Benchmark regulation Reduces overall GHG emissions intensity (50% for Paris-Aligned and 30% for Climate Transition) and follows minimum 7% self-decarbonization rate in line with the IPCC's 2018 Special Report on 1.5°C Incorporates additional climate objectives to reduce climate physical and transition risk, increase exposure to climate opportunities (in alignment with the TCFD) and broad ESG objectives. Also aligns with a 1.5°C scenario on a forward-looking basis using Trucost's Transition Pathway Model Applies exclusions based on companies' involvement in specific business activities, violations of the principles of the United Nations' Global Compact (UNGC), and involvement in relevant ESG controversies. Weights are determined using a glass-box optimization to minimise the difference in constituent weights relative to the underlying index in terms of stocks, sectors and countries. |
| S&P Global (former IHS Markit) | <u>iBoxx EUR Corporates Net Zero 2050 Paris-Aligned ESG</u> | Corporate bonds | PAB | <ul style="list-style-type: none"> Indices align with EU Low Carbon Benchmark regulation Implements a weighting strategy which aims to minimise turnover and track maturity, rating, industry, option adjusted duration and duration times spread profile of the parent index, while meeting a range of ESG constraints Incorporates additional climate objectives to manage risk and climate change opportunities (in alignment with the TCFD), increasing exposure to companies with higher ESG Risk Score and green bonds, and reducing exposure to stranded assets Applies exclusions based on companies' involvement in specific business activities, violations of the principles of the United Nations' Global Compact (UNGC), and involvement in relevant ESG controversies. |
| S&P Global | <u>S&P Net Zero 2050 Carbon Budget Indices</u> | Equities | No | <ul style="list-style-type: none"> Targets a defined carbon budget from each index's launch year to 2050, based on the IPCC 2021 Report's estimate for worldwide emissions to limit warming to 1.5C with an 83% probability Aims to achieve the budget through a constraint on ownership of scope 1, 2 and 3 GHG emissions that results in an initial footprint reduction and a yearly decarbonisation rate Weights are determined using a glass-box optimization to minimise the difference in constituent weights relative to the underlying index in terms of stocks, industries and countries. |
| S&P Global | <u>S&P Carbon Control Indices</u> | Equities | No | <ul style="list-style-type: none"> Weights are determined using a glass-box optimization to minimise index-level weighted average carbon intensity, subject to index active share, industry group weight, country weight and diversification constraints Applies exclusions based on companies' involvement in specific business activities, violations of the principles of the United Nations' Global Compact (UNGC), involvement in relevant ESG controversies, and companies with low S&P DJI ESG Scores within their GICS Industry Group |

³⁵ © 2023 S&P Dow Jones Indices LLC (S&P DJI). All rights reserved. The information provided is a summary of certain S&P DJI indices. Please refer to S&P DJI's published materials and methodologies for more information available at <https://www.spglobal.com/spdji/en/>

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| S&P Global | <u>S&P Carbon Efficient Indices</u> | Equities | No | <ul style="list-style-type: none"> Designed to reduce exposure to high-carbon companies in a systematic way, while maintaining respective GICS industry group weights of its underlying index Overweights or underweights companies that have lower or higher levels of greenhouse gas emissions per unit of revenue, calculated using the S&P Carbon Global Standard Excludes companies deemed high non-disclosing carbon emitters, according to Trucost |
| S&P Global | <u>S&P Fossil Fuel Free Indices</u> | Equities | No | <ul style="list-style-type: none"> Measures the performance of companies in the underlying index that do not own proven or probable fossil fuel reserves with greater than 50% recovery probability Each index is float-adjusted market capitalisation weighted. |
| Scientific Beta | <u>SciBeta Climate Impact Consistent Indices</u> | Equities | Standard version/ PAB | <ul style="list-style-type: none"> Core ESG and non-reporting exclusions for both indices, additional exclusions in PAB Weighting as per carbon intensity within carbon-oriented classification sectors, and adjustments made for disclosure, SBTs and climate mitigation revenues (no capitalisation-weighting anchoring within sectors) Broad capitalisation-weighting anchoring to target sector neutrality, with liquidity, signal consistency, carbon intensity and sector exposure constraints Standard version holds immediate target reduction of 0% (as opposed to 50% for PAB). |
| Solactive | <u>Solactive ISS ESG Paris-Aligned Benchmark Index Series</u> | Equities/ Corporate bonds | PAB | <ul style="list-style-type: none"> Equities benchmarks overweight companies with SBTs and holds constraints: Maximum 0.5% individual weight deviation from parent index, individual weight cap maximum of 5% and sector weight deviation minimum of 5% and 0.5 x parent index weight Fixed income constraints: Rating buckets, maturity buckets, sector deviation, issuer-level deviation: + / - 2.5% vs parent. Issuer weight 3% cap, bond level deviation + / - 0.2%, turnover constraint: parent + max. 5% Immediate consideration of scope 3 emissions for equities and fixed income. |
| Solactive | <u>Solactive ISS ESG Screened Paris-Aligned Series</u> | Equities | PAB | <ul style="list-style-type: none"> Similar to Solactive ISS ESG Paris-Aligned Series, but with additional activity-based exclusions, higher initial decarbonization (55%), higher overweight of companies with SBTs (at least 10%), additional overweight of companies with significant positive contribution to environmental SDGs by at least 10% |
| Solactive | <u>Solactive ISS ESG Net Zero Pathway Index Series</u> | Equities | PAB | <ul style="list-style-type: none"> Similar to Solactive ISS ESG Paris-Aligned Series, but with additional activity-based exclusions (e.g., civilian firearms), exclusions based on ESG rating Additionally, weights are tilted using three factors: SBTs, quality of climate disclosures, green revenues |
| Solactive | <u>Solactive Paris Aware Global Government Bond Index Series</u> | Sovereign and/or corporate bonds | N/A | <ul style="list-style-type: none"> Solactive Paris Aware Global Government Index tracks global local currency government bonds of investment grade-rated countries and features a minimum reduction of 14% in carbon intensity (per capita) compared to the investable universe as well as a 7% reduction per year against itself Solactive Paris Aware Global Aggregate Index combines constituents of the Solactive Paris Aligned Global Corporate Index and the Solactive Paris Aware Global Government Index with the sovereign part receiving an aggregate weight of 70% and the corporate part a corresponding weight of 30%. The index reflects the respective decarbonization features of its parts Series is named "Paris Aware" and not labelled as a PAB since the EU Regulation does not cover sovereign bonds. In practical terms the series features PAB-like decarbonization features for the sovereign part while the corporate bonds part is fully compliant and labelled as a PAB |

Glossary

Active investing: Investment strategies that have the goal of “beating the market” or getting better returns than certain standard benchmarks.

Benchmarks: Benchmarks have various key functions. They serve as portfolios for investors seeking passive exposure to a particular market segment, are used as performance standards against which to measure the value generated by active managers, act as proxies for asset classes, and provide a reference point for determining the price or value of various financial instruments or transactions.³⁶

Broad market indices: Indices that track the performance of a large group of stocks picked to represent the broader stock market. Most stock market indices are constructed based on market capitalisation, the higher the market value the greater the weight of that security in the index. Examples of broad-based indices are the S&P 500, NASDAQ Composite, MSCI World Index.

Net zero benchmarks: an investment benchmark that incorporates specific objectives related to greenhouse gas (GHG) emissions reductions and the transition to a low carbon economy through the selection and weighting of underlying constituents.

Cumulative benchmark divergence metric (CBD): Method of assessing climate target alignment. It evaluates the cumulative divergence of the company target pathway from the benchmark through time, yielding a single % measure of relative alignment (the more positive the value, the less aligned the company's targets: the more negative the value, the more the targets outperform the benchmark).³⁷

Constituent securities: Individual securities within a market index.

Divestment: It is the opposite of investment. The reduction of some kind of asset for financial, ethical, or political objectives, or the sale of an existing business by a firm.

Double Materiality: materiality should be understood from two perspectives, the financial materiality, and the impact materiality. The first, involves considering factors that, in the broad sense, can affect the value of the company. The second involves environmental and social impact of the company's activities on a broad range of stakeholders. (European Commission, 2019)

Exchange-traded funds (ETFs): A basket of securities that trades on an exchange just like a stock does. They typically track a particular index, sector, commodity, or other assets.

Fiduciary duty: Fiduciary duty is the requirement that certain professionals, like lawyers or financial advisors, work in the best financial interest of their clients.

Benchmark provider or Index Provider: Data providers that construct indices and benchmarks for a variety of asset classes.

Indexing refers to strategies intended to replicate the performance of benchmark indices.³⁸

Indices: Sets of securities and/or assets that have been aggregated based on pre-set criteria and whose aggregate value and composition is determined by pre-determined rules. (CFA Society UK)³⁹

Inflation-adjusted return: A measure of return that takes into account the time period's inflation rate.

Investment mandate: A set of instructions laying out how a pool of assets is to be invested, and the investment's expected risk/return profile.

Market capitalization weighting: Assign a weight to each market index constituent based on its market capitalization i.e., the product of the number of outstanding shares and the current market value of each security.

Mutual Fund: Investment vehicle consisting of a portfolio of stocks, bonds, or other securities, overseen by a professional manager. Unlike ETFs, Mutual Funds do not offer the possibility for intra-day trading.

Net Zero alignment (NZA): Net zero refers to a state in which the greenhouse gases going into the atmosphere are balanced by removal out of the atmosphere. In 2020, the IPCC stated that limiting warming to 1.5°C implies reaching net zero carbon emissions globally around 2050 and concurrent deep reductions in emissions of non-carbon forcers, particularly methane.⁴⁰

Optimisation: A benchmark construction approach in which the universe is defined according to whether potential members perform sufficiently well according to a particular scoring metric.

Passive investing: Any rules-based, transparent, and investable strategy that does not involve handpicking investments to outperform benchmarks. Index investing is the purest form of passive investing and aims to match the performance of benchmark indexes. (CFA, 2022)

Paris-Alignment (PA): The Paris Agreement sets out a global framework to avoid dangerous climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. Paris-Alignment refers to activities that are consistent with the Paris Agreement's long-term mitigation goal.

Tilting: A process in which the weights of the constituent's benchmark are redefined based on performance according to one or more metric.

Tracking error: The difference between a portfolio's returns and the benchmark or index. It is typically calculated as the standard deviation of the difference in the portfolio and benchmark returns over time.

36 CFA Society UK. <https://www.cfauk.org/-/media/files/pdf/pdf/5-professionalism/3-research-and-position-papers/benchmarks-and-indices.pdf>

37 IIGCC, 2023 From asset to portfolio alignment.

38 CFA Institute. 2022. Passive Equity Investing. Charlottesville, VA: CFA Institute. <https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/passive-equity-investing>

39 <https://www.cfauk.org/-/media/files/pdf/pdf/5-professionalism/3-research-and-position-papers/benchmarks-and-indices.pdf>

40 IPCC, 2020. <https://www.ipcc.ch/sr15/chapter/chapter-2/>

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