

Navigating the climate index jungle

Climate benchmarks and their personalities



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- Climate change has become the largest dedicated investment theme within the ESG universe¹. This reflects a shift from ESG investing which focuses on assessing issuers' risk exposures to certain ESG factors and moves into climate investing which aims to hard-wire specific climate ambitions into the investment strategy.
- To satisfy this investor demand and, in certain geographies, to meet minimum regulatory requirements, a range of climate index benchmarks have been developed. These are typically a function of carbon footprint, self-decarbonization, fossil fuel exposure, business sector activity exclusions and green revenues or a combination of all five.
- These carry distinct characteristics for example in terms of country and sector exposures, decarbonization pathways and portfolio tracking error (TE) implications. For instance, the higher the degree of carbon intensity reduction, typically the larger the tracking error. This translates into TEs which are lowest for Climate Transition Benchmarks (CTB) and highest for Climate Action and Low Carbon SRI benchmarks.
- In this paper, we explore this climate index jungle to help investors understand the trade-offs and ensure index selection meets specific portfolio objectives.

Introduction

Climate indexes have come of age. In the past, most tended to focus on climate risk mitigation, which often exclusively involved fossil fuel sector exclusions. Now, climate benchmarks are able to achieve multiple goals such as reducing the carbon intensity of an investment portfolio, allocating to climate investment solutions or aligning to a specific climate pathway. These innovations are timely since heightened geopolitical risk and record temperatures on land and sea² are strengthening investor ambition and regulatory action when it comes to climate.

This paper consists of five sections: the first, explains the momentum behind climate investing; the second, examines the construction of the most prevalent climate benchmarks in the marketplace; the third assesses the characteristics of the various climate benchmarks; and along with our conclusion we include a glossary detailing terminology relevant to climate investing.

¹ DWS analysis. Climate investment ETF flows make up approximately one quarter of overall ESG ETF flows in Europe (data as of March 2023). ETF data for the U.S. shows climate ETF AuM represented 41% of overall ESG ETF flows in the three years to August 2023

² Reuters (July 3, 2023). World hits record land, sea temperatures as climate change fuels 2023 extremes

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1 / The climate investing landscape

Structural forces have propelled climate change to the top of the ESG and sustainability agenda. These include:

1. Global warming as a relevant risk factor

Today, failure to address the climate emergency, extreme weather events, biodiversity loss and natural resource shortages are among the top global risks in terms of likelihood and impact³. These concerns have been vindicated following extreme flooding in central Asia⁴, Europe's worst drought in 500 years⁵ and by extreme heat affecting almost a third of Americans this year⁶ all of which have resulted in high levels of financial loss⁷.

2. Political developments and regulatory frameworks

National government net zero pledges now cover 92% of global GDP, 88% of global greenhouse gas emissions and 89% of the global population. This compares to 68%, 61% and 52% respectively at the end of 2020⁸. More importantly, net zero targets set in domestic legislation or policy documents has increased from 7% of total greenhouse gas coverage in December 2020 to 75%, encompassing more than 70 countries as of June 2023. Such regulation includes the U.S.'s Inflation Reduction Act and the EU's Net Zero Industrial Act.

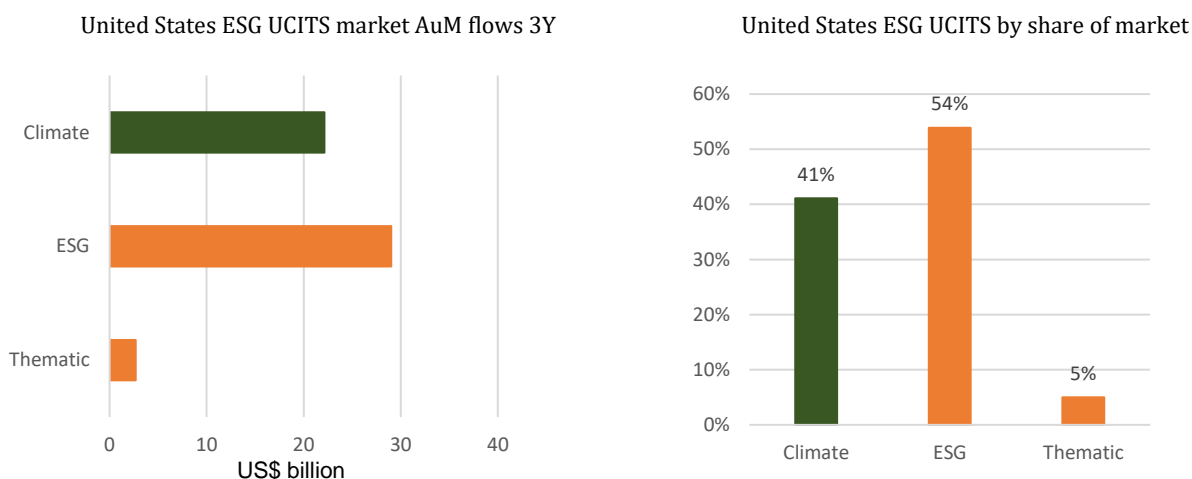
3. Investor focus on climate

The commitment to net zero emissions by financial institutions is illustrated by the launch of the Glasgow Financial Alliance to Net Zero (GFANZ) in April 2021. This brings together over 550 banks, asset owners, asset managers, insurers and other financial service providers across 50 countries. The aim of this "coalition of coalitions" is to expand the number of net zero-committed financial institutions and to establish a forum for addressing challenges associated with the net-zero transition⁹.

4. Climate investment product opportunities

Driven by the emergence of various climate indexing solutions, climate investment makes up one quarter of overall ESG ETF flow in Europe. This makes climate the largest dedicated investment area within ESG, [Figure 1](#).

Figure 1: Climate is the largest dedicated investment area in the United States



Climate ETF products focus on the climate transition and may replicate a Climate Action benchmark or a regulated Paris-aligned or Climate Transition Benchmark. Thematic funds often focus on certain societal or economic trends, such as emerging technologies; ESG funds will either be screened based on which describes exclusion-based strategies as well as including ESG Leader & SRI approaches which follow stricter exclusions and only invest in companies with the best ESG scores in defined areas.
Source: DWS Investment GmbH (Data as of 8/24/23), Bloomberg Finance LP

³ World Economic Forum (January 2023). The Global Risks Report 2023

⁴ World Bank (May 18, 2023). Quantifying the poverty impact of the 2022 floods in Pakistan

⁵ Reuters (August 23, 2022). Europe facing its worst drought in 500 years

⁶ BBC (July 2023). US heatwave: Dangerous temperatures could set new records

⁷ Munich Re (July 2023). Earthquakes, thunderstorms, floods. Natural disaster figures for the first half of 2023

⁸ Net Zero Tracker (June 2023). Net zero stocktake 2023

⁹ GFANZ (July 2023). <https://www.gfanzero.com/about/>

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2 / Climate index benchmarks compared

With growing net zero commitments by asset owners and asset managers, this is leading more and more institutional investors to pursue specified decarbonisation targets for their invested assets. In certain jurisdictions, regulators are providing a clear framework on what climate benchmarks must achieve. For example, the Paris-Aligned (PAB) and Climate Transition (CTB) Benchmarks regulation in the European Union. This marks a move beyond ESG investing which focused on risk management and specifically assessing issuers' risk exposures to certain ESG factors, into climate investing which aims to hard-wire specific climate ambitions into the investment strategy.

A climate benchmark is defined as an investment benchmark that incorporates specific objectives relating to greenhouse gas emission reductions and the transition to a low-carbon economy through the selection and weighting of underlying constituents¹⁰. In this section, we examine five of the most widely used climate index benchmarks:

- (i) EU Climate-Transition Benchmark (CTB)
- (ii) EU Paris-Aligned Benchmark (PAB)
- (iii) Carbon Budget Benchmark
- (iv) Climate Action Benchmark
- (v) Low Carbon SRI Benchmark

When it comes to index design, these benchmarks will typically be a function of their approach to one or more of the following five metrics:

- a. Carbon footprint
- b. Self-decarbonization
- c. Fossil fuel exposure exclusions
- d. Other business activity exclusions
- e. Green revenues

The European climate benchmarks refer to the EU CTB and the PAB. European regulation stipulates the criteria that need to be met for an index to be labelled either CTB or PAB, namely both indexes must:

- Enforce a **greenhouse gas intensity** reduction of at least 30% for CTB and 50% for PAB compared to the investible universe. While Scope 1, 2 and 3 emissions are captured when it comes to carbon intensity reduction, due to insufficient coverage the inclusion of Scope 3 greenhouse gas emissions data are being phased-in according to the sector. By December 2024, all sector inclusions should be complete.
- Adopt **self-decarbonization**, whereby both indexes enforce an average index-level carbon intensity reduction of at least 7% per year. This is consistent with aligning to the Intergovernmental Panel on Climate Change assumptions for a 1.5°C temperature pathway.
- Unlike the CTB, the PAB imposes an additional reduction in **fossil fuel exposures** via excluding issuers that breach certain revenue thresholds in coal (>1%), oil (>10%), gas (>50%), and coal, oil, and natural gas power generation (>50%) sectors. As a result, while both indexes pursue the same decarbonization path, the PAB is more ambitious and stricter.
- Enforce **activity exclusions** of those issuers involved in controversial weapons and tobacco production, as well as exclusions to issuers in violation of the United Nations Global Compact (UNGC) principles and the Organisation for Economic Cooperation and Development (OECD) Guidelines for Multinational Enterprises as part of meeting the "Do No Significant Harm (DNSH)" principle¹¹.
- For CTB, the share of **green to brown revenues** should be equal or greater than the parent index. For PAB, the green revenue share should be significantly larger than the parent index and by up to a factor of four. In addition, the regulation requires a minimum exposure to high impact sectors which are at least equal to the parent index. These are identified across nine sectors which are critical to the low-carbon transition. This ensures that engagement wins before divestment.

¹⁰ UNEP FI (February 2022). EU Climate Benchmarks https://www.unepfi.org/wordpress/wp-content/uploads/2022/02/Climate-Benchmarks_all-members-presentation.pdf

¹¹ The EU taxonomy stipulates that a company, which operates in a Taxonomy-eligible sector, must disclose that they do no significant harm to any of the six environmental objectives: climate change mitigation, climate change adaptation, water and marine resources, circular economy, pollution prevention and control, biodiversity and ecosystem protection

If one of these metrics is violated for two consecutive years, then the index forfeits the right to be labelled either CTB or PAB.

Carbon Budget benchmarks are generally focused on just two metrics: carbon footprint and self-decarbonization. The foundations of a Carbon Budget benchmark are based on estimates from the Intergovernmental Panel on Climate Change (IPCC) and the available global carbon budget. This will be a function of the temperature pathway and its accompanying confidence level. For example, according to the IPCC's assessment¹² maintaining an 83% likelihood of limiting global warming to 1.5°C is equivalent to a global carbon budget of 300GtCO₂. If the temperature pathway is relaxed to 2.0°C, then the carbon budget would rise to 900GtCO₂. As a result, and unlike CTB and PAB, the Carbon Budget benchmark is solely focused on decarbonization.

One example of a Climate Budget benchmark is the range of S&P Dow Jones Carbon Budget benchmarks launched in September 2022. These define a specific carbon budget which is aligned to a 1.5°C temperature pathway. The indexes aim to achieve the corresponding target carbon budget through a constraint on ownership of total Scope 1, 2 and 3 greenhouse gas emissions. Given the dynamic nature of the carbon budget, the pace of decarbonization will be determined by the inception year and hence the remaining carbon budget allowance. Starting in 2023, the implied decarbonization rate is in excess of 10% per annum, and consequently more aggressive than the CTB and PAB¹³.

Climate Action benchmarks are designed to represent the performance of companies that have been assessed to lead their sector peers as being best positioned for climate transition. The approach is therefore based on a best-in-class securities selection across a range of climate metrics. For example, the MSCI Climate Action indexes select the top 50% of companies by count in each GICS sector based on a) emissions intensity for Scope 1, 2 and 3, b) adoption of science-based targets, c) the climate risk management approach and d) the share of green revenues. The ultimate objective is to identify companies that are comparatively more prepared to lead their sector's low carbon transition than their peers¹⁴.

Evidence suggests that companies with approved science-based targets (SBT) outpace the broader economy in their decarbonization.¹⁵ This offers a compelling case to incorporate SBTs as a variable in portfolio construction. Such an approach can offer benefits to the investor and society at large: The investor has some confidence in the stability of their portfolio and potentially reduced future turnover due to changes in company climate metrics. Moreover, from a financial perspective, companies that have validated their 1.5°C target have seen a widening in their economic P/E ratio compared to companies with less ambitious or no target.¹⁶

Low Carbon SRI benchmarks are typically designed to focus on two dimensions of carbon risk, namely the carbon footprint and fossil fuel exposures of a portfolio. In addition, low carbon SRI typically adopts exclusions relating to controversial sectors and sector involvement. The key features of the various climate index benchmarks are illustrated in [Figure 2](#).

¹² IPCC (October 2021). Summary for policymakers https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

¹³ S&P Dow Jones (January 2023). S&P Net Zero 2050 carbon budget indices methodology

¹⁴ MSCI (Climate Action Indexes. Taking action for net zero

¹⁵ Science-based Targets Initiative (SBTi) Progress Report 2021.

¹⁶ DWS Research Institute (November 2021). Economic P/E is defined as enterprise value (EV) over net capital invested (NCI) divided by cash return on capital invested (CROCI): (EV/NCI) / CROCI.

Figure 2: Key features of climate benchmarks

	Climate Transition	Paris Aligned	Carbon Budget	Climate Action	Low Carbon SRI
Carbon footprint	At least 30% reduction of GHG intensity	At least 50% reduction of GHG intensity	Initial GHG intensity reduction	Selection based on best-in-class within each respective sector according to carbon intensity and science based targets	Carbon reduction of at least 50%
Self-decarbonization	7% per annum	7% per annum	Decarbonization rate dependent on inception year and generally >10% per annum		
Activity exclusions	Issuers in breach of UNGC and involvement in controversial weapons and tobacco production and complying with DNSH principle	Issuers in breach of UNGC and involvement in controversial weapons and tobacco production and complying with DNSH principle		Issuers involved in controversial weapons, tobacco, thermal coal mining, oil sands. Issuers in breach of high emission thresholds	Issuers involved in controversial weapons, coal revenues >1%, oil sands >5%
Fossil fuel exposure	30% reduction in emissions from fossil fuel reserves	Exclusions: revenues from coal >1%, Oil >10%, Coal, oil & gas power generation >50%			Fossil fuel exposure reduction of at least 50%
Green revenue share	The share of green to brown revenues should be equal or greater than the parent index	Green share should be significantly larger than the parent index and by up to a factor of four		Selection based on best-in-class high sector-relative green business revenues	

Source: DWS Investment GmbH (August 2023)

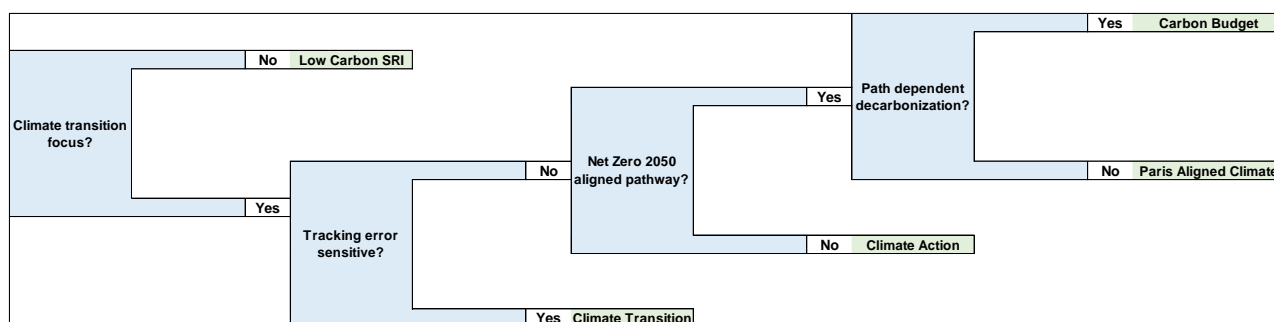
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3 / Selecting the appropriate climate index benchmark

The decision tree in [Figure 3](#) provides one route to help investors decide on the appropriate climate index benchmark. Once a decision has been made on whether to focus on the climate transition, then selection starts to move into tracking error constraints, then whether to adopt a net zero and decarbonization pathway.

Figure 3: Indicative decision tree which can help select appropriate climate index benchmark



Source: DWS Research Institute (August 2023)

In terms of portfolio risk, tracking error (TE) is the one attribute that is often cited as the primary consideration when it comes to the selection of an appropriate climate index benchmark. The TE is calculated by using the annualized standard deviation of the difference between the benchmark index and the market index returns. This metric is distinct from “Tracking Difference” or TD which captures the difference between the returns of the climate index and the benchmark over the long-term.

In an ideal world, an investor would expect the TE as well as TD to be as close to zero as possible to minimize the implementation risk of a climate strategy. For some long-term investors, a TD may even reflect part of the initial investment case, as de-risking and financial returns associated with leaders in the climate transition could drive greater divergence in performance. TE is then understood as shorter-term risk, but for many investors venturing into climate investing, it is arguably the more relevant consideration. Investors may find a useful analogy in the performance of their ESG allocations, where the past two years have seen tracking errors flare-up coupled with temporary underperformance.

Tracking error is closely tied with climate ambition

For investors seeking to bring climate ambition into their investment portfolios, there are two broad options available:

- (i) Climate ambition based on exclusions (Climate Transition, Paris Aligned, Carbon Budget or Low Carbon SRI would fall within this category)
- (ii) High climate ambition based on inclusion and engagement (Climate Action may be seen as part of this option).

To examine the impact of the index options chosen on the TE, we have used MSCI World as the market index and compared it against representative climate benchmark indexes, [Figure 4](#). One pattern which emerges is that the moment an investor attempts to embed high climate ambition into a portfolio, it is likely to be at the expense of high tracking error.

Figure 4: Climate Index Benchmarks versus the MSCI World

	MSCI World	CTB	PAB	Low Carbon SRI	Climate Action
No. of Constituents	1,512	1,146	1,137	681	758
Realized TE* (ann'd)		0.60%	1.48%	1.64%	1.72%
Turnover	2.15%	14.53%	11.04%	14.63%	16.61%
Weight of EN+MA+UT sectors	11.62%	8.06%	5.60%	4.28%	9.73%

Source: MSCI Indices, Solactive Indices data as of July 2023. CTB: MSCI World Select Sustainability Screened CTB Index (USD); PAB: Solactive ISS ESG Developed Markets Net Zero Pathway Index (USD); Low Carbon SRI Leaders Index (USD); Climate Action: MSCI World Climate Action Index (USD); *Tracking Error is annualized standard deviation of monthly active returns measuring the dispersion of index excess returns relative to its benchmark, over the period of past one year. Turnover is the percentage change in the composition of an index at each index review. EN stands for Energy, MA stands for Materials and UT stands for Utilities. We specifically isolate these three sectors separately as these are high carbon intensive sectors

We also see significantly higher turnover relative to the market index, which is an indication of the change in the composition of the index at each index review. We have included the weight of the carbon intensive sectors to underline the point that regardless of whether the path of decarbonization is based on exclusion or inclusion, it will tend to realize a higher tracking error.

Figure 5 illustrates the trade-off between carbon intensity reduction and resulting tracking error versus the starting universe. We adopt the two most common perspectives used by investors: Emissions per unit of enterprise value including cash (EVIC), the metric proposed by the EU Commission, and Emissions per unit of sales, a metric that has a long track record with ESG investors and tends to be more stable. We look at Scope 1, 2 and 3 emissions for the most comprehensive measure of direct and indirect emissions. The first thing to notice is the higher the degree of carbon intensity reduction, typically the higher the tracking error. Next, the size of the circle displays the number of stocks captured in each strategy. Broader and more representative indices may help control tracking error, but more importantly, high exclusion rates are not a necessity to achieve decarbonization, a point we will return to later. Overall Low Carbon SRI and PAB benchmarks currently offer the largest reduction in carbon intensity, but, investors are well advised to factor in differences across lenses to measure intensity.

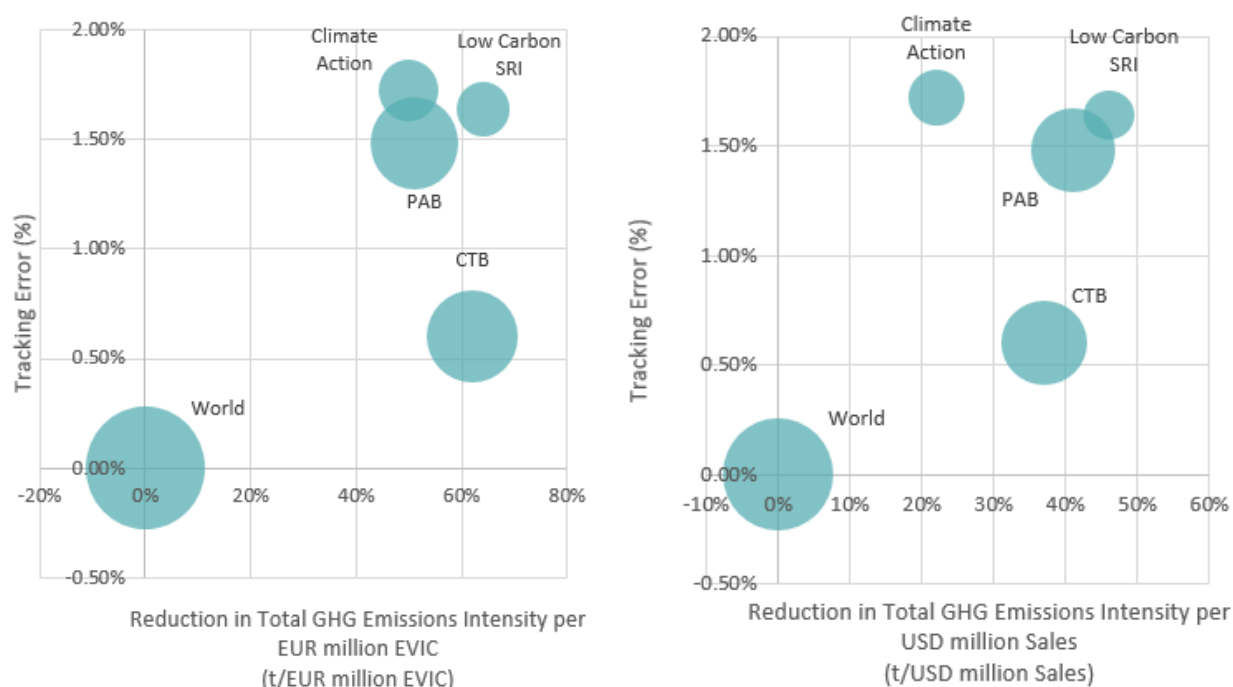
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Figure 5: The trade-off between carbon reduction and tracking error

The first chart shows carbon reduction relative to emissions per unit of enterprise value including cash (EVIC)

The second chart examines carbon reduction relative to emissions per unit of sales, a more well-established metric



Source: DWS Investments GmbH (August 2023; based on MSCI and Solactive indices, data as of August 2023. Tracking Error is annualized standard deviation of monthly active returns measuring the dispersion of index excess returns relative to its benchmark, over the period of past one year. GHG Emissions data based on from MSCI ESG Research. CTB: MSCI World Select Sustainability Screened CTB Index (USD); PAB: Solactive ISS ESG Developed Markets Net Zero Pathway Index (USD); Low Carbon SRI Leaders Index (USD); Climate Action: MSCI World Climate Action Index (USD);

Does high TE lead to poor results?

Most long-term investors are naturally more concerned about the returns generated by the portfolio over the long term. However, Figure 6 reveals that the one-year performance of the climate benchmarks based on exclusions (CTB, PAB and Low Carbon) lagged that of the market index. This underperformance can be attributed to the underweight exposure to commodity-oriented businesses which performed strongly last year. Conversely, the Climate Action benchmark performed strongly even on a one-year horizon, courtesy of its relative high exposure to the energy and materials sectors as outlined in Figure 4.

The past three-year performance also presents a relatively lacklustre picture, with Low Carbon SRI standing out by its outperformance versus the market index. It is only over a five year period where the climate benchmarks have outperformed the MSCI World index where historical data are available.

Figure 6: MSCI World Climate Index Benchmarks – Active Performance (net of MSCI World returns)

	MSCI World	CTB active returns	PAB active returns	Low Carbon SRI active returns	Climate Action active returns
1 year return	13.48%	-1.09%	0.36%	-0.18%	0.63%
3 years return (ann'd)	11.67%	-0.67%	-0.48%	0.20%	-0.39%
5 years return (ann'd)	9.12%	0.04%	0.98%	0.88%	NA
Annualized volatility	17.78%	17.80%	17.87%	18.28%	18.04%

Past performance is no guarantee of future results

Source: MSCI Indices, Solactive Indices data as of July 2023. based on monthly returns, for three years; CTB: MSCI World Select Sustainability Screened CTB Index (USD); PAB: Solactive ISS ESG Developed Markets Net Zero Pathway Index (USD); Low Carbon SRI Leaders Index (USD); Climate Action: MSCI World Climate Action Index (USD);

Characteristics of climate index benchmarks

We also examine the climate indices using common financial metrics like dividend yield and price-to-book. We find that the climate constraint tends to compress the dividend yield across all the climate benchmarks, Figure 7. On the other hand, the price-

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to-book tends to widen for three out of four climate index benchmarks examined. The compression in the dividend yield as well as the increase in the price-to-book is the most extreme for the Low Carbon SRI, which can be attributed to its sector allocation.

Low Carbon SRI has almost an 8% higher exposure to IT, financials, communication services and healthcare. Amongst these sectors, the highest overweight allocation, relative to MSCI World, is to the IT sector at over 3%. The IT sector tends to have a high price-to-book and low dividend yield. On the other hand, carbon intensive sectors tend to score high on dividend yield, which explains the dividend yield of CTB and CAB (as their exposure to Energy, Materials and Utilities is closer to the market index). This would tend to suggest that climate conscious benchmarks may appear to have more growth factor characteristics. In fact, based on current index compositions, a moderate growth bias is the only bias we can consistently detect across climate solutions.

Figure 7: MSCI World Climate Index Benchmarks – Portfolio characteristics

	MSCI World	CTB	PAB	Low Carbon SRI	Climate Action
Dividend Yield	1.96%	1.88%	1.93%	1.69%	1.80%
Price-to-Book	3.07x	2.99x	2.79x	3.78x	3.48x
IT+FI+CSer+HC	56.69%	60.25%	63.95%	65.20%	63.07%
EN+MA+UT	11.62%	8.06%	5.66%	4.28%	9.73%

Past performance is no guarantee of future results

Source: MSCI Indices, Solactive indices data as of July 2023, based on monthly returns, for three years. IT stands for Information Technology, FI - Financials, CSer - Communication Services, HC - Healthcare, EN - Energy, MA - Materials and UT - Utilities. CTB: MSCI World Select Sustainability Screened CTB Index (USD); PAB: Solactive ISS ESG Developed Markets Net Zero Pathway Index (USD); Low Carbon SRI Leaders Index (USD); Climate Action: MSCI World Climate Action Index (USD);

Carbon Budget Index

This leaves the Carbon Budget Index Benchmark, for which we use S&P Dow Jones climate indexes. This benchmark is a relatively late entrant to the climate index universe¹⁷. As a result, this makes meaningful performance comparison difficult beyond one year, Figure 8.

Figure 8: U.S. Climate Index Benchmarks versus the S&P 500

	S&P 500	CTB	PAB	Carbon Budget	Climate Action
No. of Constituents	503	378	359	445	500
Realized TE*	0.0%	1.50%	1.70%	NA	0.60%
1 year return	12.44%	13.63%	14.14%	12.44%	12.49%
3 years return	13.18%	12.95%	13.08%	NA	12.90%
5 years return	11.61%	12.47%	12.73%	NA	11.44%
Volatility	18.03%	18.84%	19.01%	NA	18.13%
Wt. avg. carbon intensity	177.68	123.89	80.01	144.36	128.75
Dividend Yield	1.57%	1.45%	1.44%	1.47%	1.65%
Price-to-Book	3.99x	4.28x	4.50x	4.06x	4.48x
EN+MA+UT	9.40%	7.90%	2.30%	7.30%	10.10%
IT+FI+CSer+HC	62.50%	64.50%	68.30%	65.50%	61.40%

Past performance is no guarantee of future results

Source: S&P Dow Jones Indices, data as of July 2023. *Tracking Error is annualized standard deviation of monthly active returns measuring the dispersion of index excess returns relative to its benchmark over five years, up to July 29, 2022. Turnover is the percentage change in the composition of an index at each index review. EN stands for Energy, MA stands for Materials and UT stands for Utilities. IT stands for Information Technology, FI - Financials, CSer - Communication Services, HC - Healthcare.

¹⁷ The S&P 500 Net Zero 2050 Carbon Budget (2022 Vintage) Index was launched July 25, 2022.

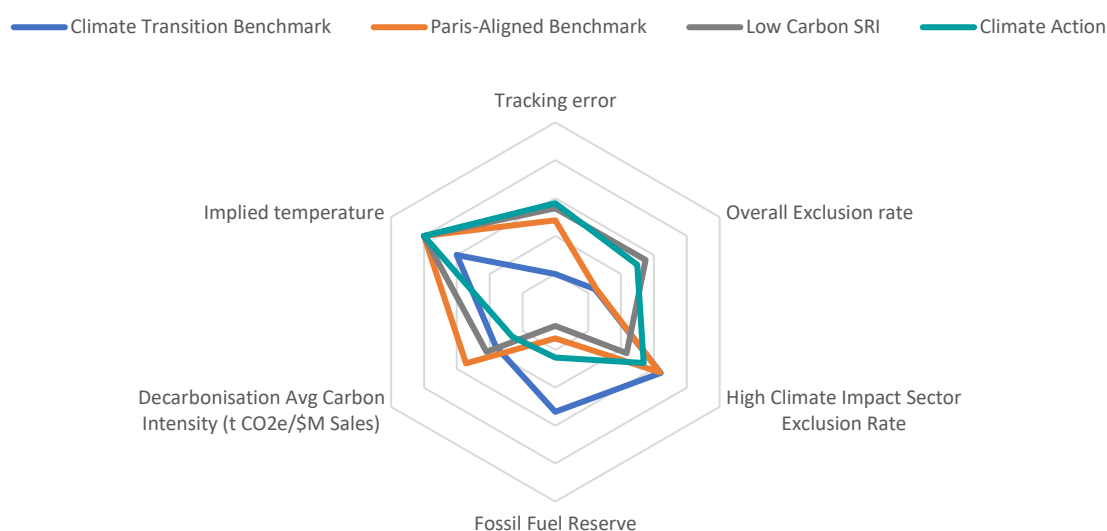
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Benchmarks compared

To facilitate a cross-comparison of the various climate index approaches, we compare index characteristics across two dimensions, risk of implementation and current and future decarbonization, [Figure 9](#). At a high-level, the characteristics of the low carbon SRI and Climate Action benchmarks are relatively aligned. Unsurprisingly, tracking error is lowest in the CTB and highest in Climate Action and Low Carbon SRI. This aligns with the overall exclusion rate which is highest in the latter two indexes and lowest for the CTB. [Figure 9](#) also reveals the areas where the PAB is more ambitious than the CTB, which is captured in the former's lower exposure to fossil fuel reserves, its larger carbon intensity reduction, and its lower implied temperature compared to CTB.

Figure 9: Climate index benchmark characteristics compared



Source: DWS Investment GmbH (August 2023), Bloomberg Finance LP

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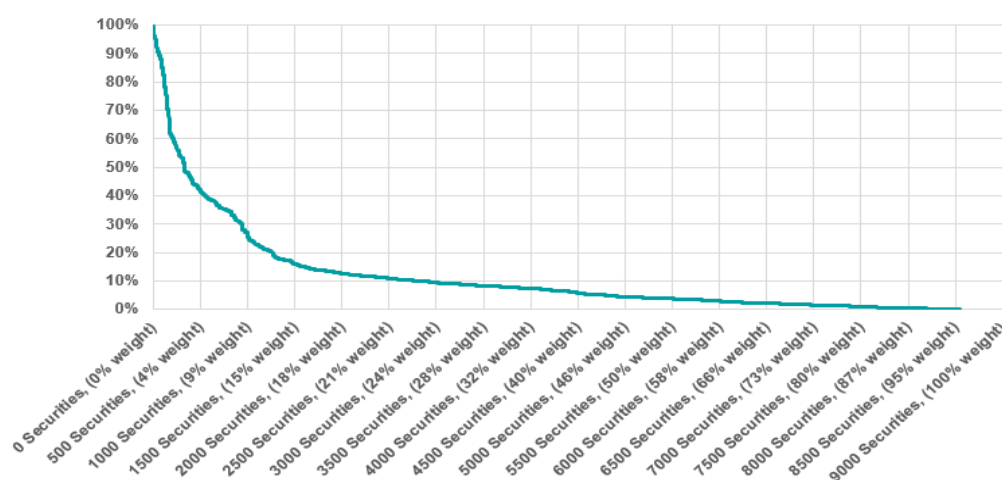
4 / Conclusion

The importance of moving beyond “paper decarbonisation”

Selecting the appropriate climate benchmark is a function of key targets and objectives such as carbon intensity reduction, pursuing a decarbonization pathway, the appetite for issuer exclusions, capturing climate investment solutions, and whether or not tracking error constraints exist.

In most cases, reducing *portfolio* emissions is the primary goal given the increasing number of asset owners and asset managers signed up to net zero pledges. Such portfolio emission reduction can be achieved with ease. For example, by merely excluding around 3% of the weight of the MSCI ACWI IMI¹⁸ can reduce index emissions by 50%, [Figure 10](#).¹⁹ Similarly, strict exclusion-based methodologies like the Low Carbon SRI benchmark often achieve considerable decarbonization versus their parent benchmarks with the added benefit of this often being accompanied by improvements in other ESG metrics beyond climate.

Figure 10: % of the ACWI IMI Current WACI* reduction achieved after removal and reweighting



* WACI: Weighted average carbon intensity
Source: DWS Investments GmbH (February 2023), Bloomberg Finance LP

But investors are increasingly interested in reinforcing carbon emission reduction at an investment portfolio level with tangible real-world decarbonisation outcomes. Decarbonization at a portfolio (paper) level may ultimately be transmitted into real world emission reduction. In this context, investors can influence asset prices and ultimately the cost of capital for those companies divested from a portfolio perspective. This is often referred to as the ‘law of large numbers’, whereby a large enough withdrawal of investor money should increase the true cost of refinancing due to the resulting decrease in equity value.

In addition, where a climate benchmark filters security selection according to science-based targets, such as Climate Action benchmarks, it means that these issuers are obliged to pursue them and transparently report on their progress in real-world decarbonization. And while it may be true that climate ambition comes at the cost of high tracking error, the saving grace is that a high tracking error has not necessarily translated into significant underperformance over the long term

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¹⁸ The MSCI ACWI Investable Market Index captures large, mid and small cap representation across 23 Developed Markets and 24 emerging Market countries

¹⁹ DWS International GmbH calculations, as of 27/02/2023. Index emissions calculated as weighted average carbon intensity: Scope1+2 emissions / sales

5 / Glossary

Figure 11: Climate terminology and definitions

<p>Carbon budget: the estimated cumulative amount of global carbon dioxide emissions that is estimated to limit global surface temperature to a given level</p>	<p>Intergovernmental Panel on Climate Change (IPCC): is an intergovernmental body of the United Nations which advances scientific knowledge about climate change caused by human activities</p>
<p>Carbon footprint: the total set of greenhouse gas (GHG) emissions caused by a company, service or product. It is often expressed in terms of the amount of carbon dioxide, or its equivalent of other GHGs emitted</p>	<p>Paris-Alignment Investment Initiative (PAII): IIGCC's investment framework for aligning portfolios to the goals of the Paris Agreement</p>
<p>Carbon intensity: the amount of CO₂ emissions released per unit of another variable such as revenues or GDP</p>	<p>Principal Adverse Impact (PAI): the negative effects, material or likely to be material on sustainability factors that are caused, aggravated by or directly linked to investment decisions and advice</p>
<p>Carbon offset: a reduction in GHG emissions or an increase in carbon storage that is used to compensate for emissions that occur elsewhere</p>	<p>Net Zero alignment: refers to a state in which the greenhouse gas emissions going into the atmosphere are balanced by removal out of the atmosphere</p>
<p>Carbon removal: a process in which CO₂ is removed from the atmosphere using technologies such as afforestation, agricultural practices that sequester carbon in soils or bioenergy with carbon capture and storage</p>	<p>Net Zero Asset Owner Alliance: an institutional investor initiative committed to transitioning their investment portfolios to net zero by 2050</p>
<p>Climate positive: an activity which goes beyond achieving net zero carbon emissions by removing additional carbon dioxide from the atmosphere</p>	<p>Net Zero Asset Managers initiative: an association of asset managers committed to supporting investing aligned with net zero emissions by 2050</p>
<p>Double materiality: the importance of financial information both in terms of a company's financial value and the impact on the world around it</p>	<p>Science based targets: a set of goals backed by science for an organization to reach net zero, usually aligned with the limit to keep global warming to 1.5°C</p>
<p>Global warming: the estimated increase in global mean surface temperature averaged over a 30-year period and expressed relative to pre-industrial levels</p>	<p>Scope emissions: Scope 1 emissions include all direct emissions from the activities of an organization. Scope 2 includes indirect emissions from the electricity bought and used by an organization. Scope 3 includes emissions are the emissions occurring that an organization does not own or control for example in its suppliers or the products it sells</p>
<p>Greenhouse gas emissions: gases in the earth's atmosphere that trap heat. The primary GHGs are carbon dioxide, nitrous oxide, methane and ozone</p>	<p>Task Force on Climate-related Financial Disclosures (TCFD): published recommendations on climate-related financial risk disclosures which have become widely recognized as industry standards</p>
<p>Institutional Investors Group on Climate Change (IIGCC): European association for institutional investors to work on common investment frameworks</p>	<p>Tracking error: the difference between a portfolio's returns and the benchmark or index</p>

Source: DWS Investment GmbH (August 2023). IIGCC, IPCC

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