Scientific Climate **Indices**
An EDHEC Venture

Five Problems with PAB Climate Indices

Climate Mitigation Series
Episode 1

SciX Insights — November 2026



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Amid widespread criticism of Paris-Aligned Benchmarks (PAB) from investors, advisors and index providers, new generations and iterations of climate mitigation indices have emerged. Yet, before evaluating the potential strengths and weaknesses of both newer PAB products and non-PAB indices, it is first worth reviewing the reasons why PAB-based products have attracted growing disapproval since they first emerged in 2020.

In this first episode of SciX Insights' Climate Mitigation Series, we therefore consider **five key concerns** surrounding PAB products and ask why they may have disappointed investors both financially and extra-financially. Common complaints range from growing concentration and sector biases to lack of influence on real-world decarbonization.

Key takeaways:
- **Rigid decarbonization trajectories will likely result in greater tracking error and increasingly concentrated portfolios**. This issue will compound over time as the real economy fails to keep pace with unrealistic decarbonization trajectories.
- **In addition, substantial sector and stock-specific risks** can be created by both mandatory exclusions and portfolio reweighting. These include risks unrelated to climate objectives.
- **A lower portfolio carbon footprint does not, by itself, demonstrate a contribution** to real-world decarbonization. This is where emissions attribution techniques can help: corporate transition pathways can be assessed while managing financial risks.

In the face of these challenges, investors might wonder: are the problems inextricably linked to the PAB regulatory framework or do they reflect specific implementation decisions taken by index providers? Naturally, there are differences between PAB products: a specific undesirable outcome in one PAB index would not necessarily have been experienced to the same degree in all PAB indices. Yet, taken as a whole, we believe that these criticisms are exceptionally difficult to rebut. Indeed, an implementation tweak that mitigates one concern may only worsen another.

The more useful question, perhaps, is whether a climate index (whatever its label) actually allows investors to pursue credible climate objectives while retaining appropriate control over the financial consequences.

A brief recap

Paris-Aligned Benchmarks were designed by European regulators to make climate mitigation investing more transparent and more demanding. By attempting to translate the objectives of the 2015 Paris Agreement into measurable portfolio requirements, they offered investors a common framework and a regulatory standard so that products could be accurately labelled. This work led to the launch of the first EU-compliant PAB index in 2020, with the support of a consortium of French institutional investors. PAB indices gained momentum in 2021-2023, reaching EUR 116bn of assets under indexation.[1]

The proposition appeared to make a great deal of sense at the time: PABs would immediately deliver an equity allocation with a substantially lower carbon footprint, a predefined decarbonization trajectory and safeguards to ensure the most carbon-intensive parts of the economy remained invested and therefore financed.

1 - https://finance.ec.europa.eu/system/files/2023-12/231213-sustainable-finance-platform-draft-report-eu-taxonomy-aligning-benchmarks_en.pdf

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The regulation required PAB-labelled indices to satisfy several criteria. They had to:

- maintain a weighted average portfolio Greenhouse Gas intensity (Scopes 1, 2 and 3) at least 50% lower than that of the parent investable universe;
- reduce GHG intensity by at least 7% per annum on average;
- maintain a total exposure in high climate impact sectors at least equal to that of the parent investable universe;
- apply a series of exclusions based on corporate activity, including 'baseline exclusions' (tobacco, controversial weapons, UN Global Compact) and prescriptive 'fossil fuel exclusions' (remove companies earning more than a certain percentage of revenues from certain fossil fuels).

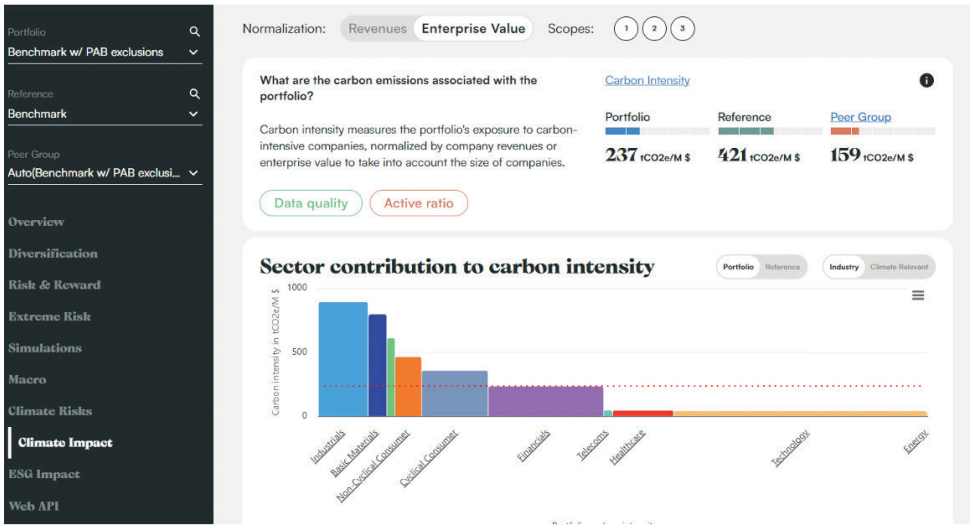
The same regulation also established Climate Transition Benchmarks (CTB), which are broadly similar in terms of constraints albeit with a lower mandated reduction in overall GHG intensity (-30% rather than -50%) and no prescriptive 'fossil fuel exclusions'.

Criticism 1: The 50% constraint ignores market-wide developments

The requirement that PAB indices be at least 50% less carbon intensive than the investable universe at all times introduces a relative test that may appear unhelpfully arbitrary. The rule somehow treats a lower footprint than the market as a strictly necessary condition for alignment without assessing the market's own decarbonization. In principle, the rule could become increasingly irrelevant and restrictive if the overall market itself delivers emissions reductions. Moreover, it could create questionable incentives for corporations that are successfully transitioning but that happen to belong to a highly emitting sector.

The other problem with the "50% rule" is the varying overlap with the hard exclusions rule described. Today, simply applying PAB-compliant exclusions to a global developed market cap-weighted benchmark generates a 44% reduction in carbon footprint, as shown below in Exhibit 1 (screenshot from SciX's portfolio analytics platform). Continuing the argument above, the extent of this overlap may vary over time: improving corporate behavior could make it increasingly unrealistic to deliver the bulk of the required reduction through exclusions alone.

Exhibit 1: The effect of PAB exclusions on GHG intensity of a global developed benchmark



Source: SciX analytics platform. The benchmark is a global, developed market cap-weighted index with approximately 1,200 constituents. The "benchmark w/ PAB exclusions" is a modified version of the benchmark where all PAB-compliant stock exclusions have been applied and where the available capital has been proportionally reallocated to the remaining stocks. GHG intensity is computed using Scopes 1, 2 and 3 emissions, normalized by Enterprise Value.

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In practice, many investors have exercised a preference for climate transition benchmarks (CTB) versus Paris-Aligned Benchmarks, in part because the former has a less aggressive goal of 30% rather than 50%. Yet while the number may be less ambitious, it is similarly arbitrary.

Criticism 2: The 7% trajectory can become harder to deliver

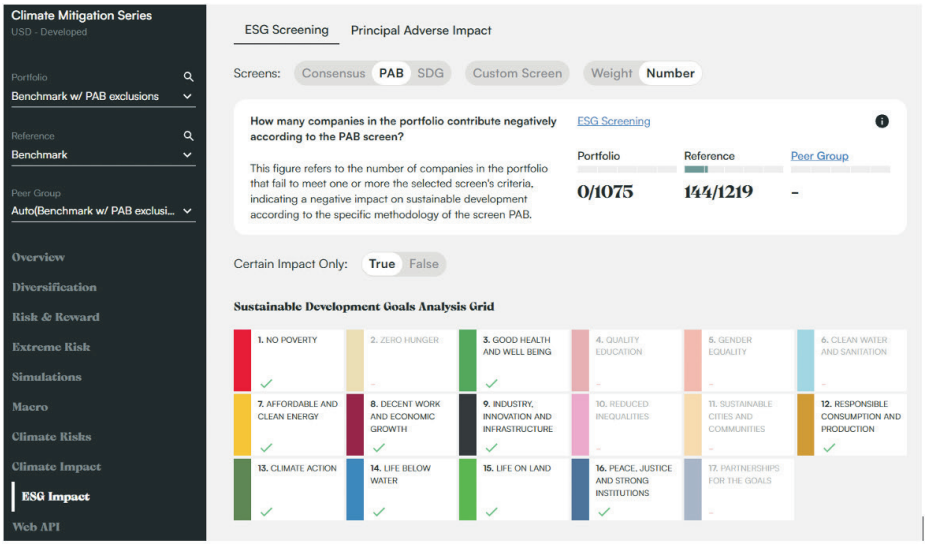
A 7% annual reduction in portfolio-level carbon intensity compounds to approximately 52% over ten years. As such, PAB indices (and CTB indices) must continue significantly reducing their intensity from an already reduced starting point, even when companies in their investment universe are making much slower progress.

Slow decarbonization progress is, of course, what recent years have delivered in the economy at large. The International Energy Agency reports that between 2020 and 2024, the global GHG intensity by GDP only declined by 1.8% per annum.[2] It is true that PAB regulation establishes that GHG **intensity be normalized by enterprise value**, resulting in faster declines than intensity by GDP, but this is driven by equity price multiple expansion and is therefore subject to possible reversals: when stock prices pull back from record heights, those intensity calculations also suffer.

In practice, the outcome is an index that progressively moves towards a smaller and smaller group of eligible companies to comply with its declining carbon budget. Interestingly, AF Advisors reported in January 2026[3] that the MSCI World Climate Paris Aligned Index had already declined from nearly 700 constituents in 2021 to around 460 at the end of 2025 and we note that the number was even smaller (400) as of end-October 2026.[4] The figures alone do not, of course, establish the extent to which this universe contraction is driven by the "7%" rule, the "50% rule" or other parameters.

To put that 400-stock tally into context, Exhibit 2 shows that applying PAB-compliant stock exclusions to a global developed benchmark removes 144 names from a portfolio of 1,219 names, bringing the number of constituents down to 1,075.

Exhibit 2: Effect of PAB exclusions on number of stocks in a global developed benchmark



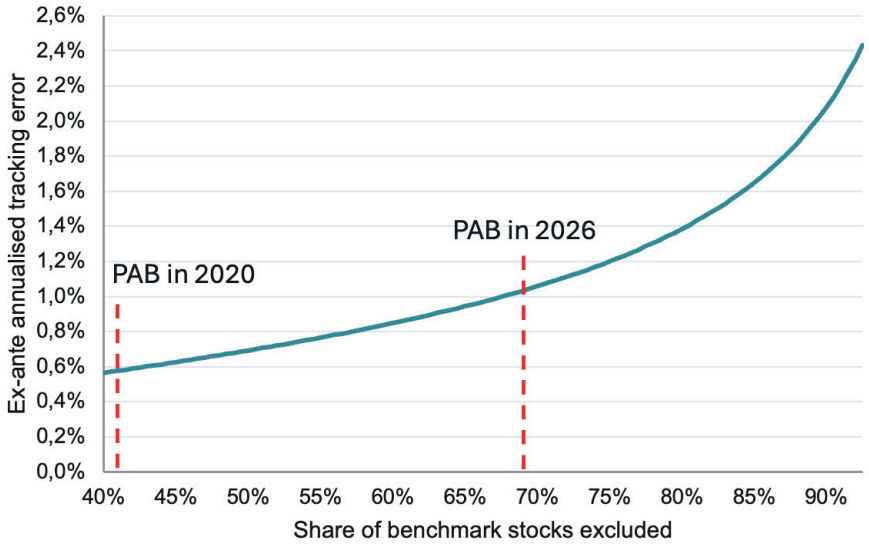
Source: SciX analytics platform. The benchmark is a global, developed market cap-weighted index with approximately 1,200 constituents. The "benchmark w/ PAB exclusions" is a modified version of the benchmark where all PAB-compliant stock exclusions have been applied and where the available capital has been proportionally reallocated to the remaining stocks. GHG intensity is computed using Scopes 1, 2 and 3 emissions, normalized by Enterprise Value.

2 - https://www.iea.org/data-and-statistics/charts/intensities-per-gdp-2015-2024
3 - https://af-advisors.com/news/fewer-options-for-pab-investors/
4 - https://www.amundietf.co.uk/pdfDocuments/monthly-factsheet/IE000CL68Z69/ENG/GBR/INSTITUTIONNEL/ETF/20261031

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To some extent, an index can compensate for slower progress in some companies through portfolio reallocation: after all, the "7%" rule applies to the overall portfolio and does not require every constituent to reduce its emissions by 7% each year. Yet this flexibility is a buffer rather than a solution; if corporate decarbonization persistently falls short, portfolio adjustments must do more and more of the work. Importantly, such adjustments will also come at a cost in terms of diversification, turnover and most importantly benchmark deviation. As an illustration, Exhibit 3 shows the increase in tracking error (versus the benchmark and under simplifying assumptions) as the set of eligible stocks shrinks down.

Exhibit 3: Tracking error increases as the eligible universe shrinks



Source: SciX. All stocks are assumed to have the same volatility, comprised of the same mix of systematic and idiosyncratic risks. Portfolios are assumed to be equally-weighted to compute a conservative estimate of ex-ante tracking error.

Criticism 3: Sector protection still leaves substantial room for sector biases

PAB regulation does not prohibit entire GICS sectors by name. However, activity-based exclusions can remove substantial parts of a sector. Oil producers and refiners, for example, can breach the oil-revenue threshold, while fossil-fuel-dependent electricity generators can fall within the power-generation exclusion. Other companies operating within high-emitting sectors may remain eligible in theory but receive lower weights in practice because they consume too much of the portfolio's carbon budget, irrespective of whether they are on a successful transition trajectory. This can affect companies producing materials or providing transport services, even where a mandatory exclusion is not in play.

The high-climate-impact-sector constraint set out in the PAB regulation offers **only partial protection** for these unintended risk consequences. The constraint operates in aggregate: a reduction in one high-impact sector can be offset by an increase in another. As such, keeping the combined weight of these activities unchanged does not ensure that the portfolio retains a representative exposure to electricity generation, industrial production or transport. For instance, reduced exposure in Energy or Utilities (higher emitting sectors) could be in principle compensated through exposure to parts of Information Technology and Health Care (lower emitting sectors).

In practice, the hard decarbonization targets have indeed generated substantial sector deviations versus the benchmark, leaving investors exposed to undiversifiable systematic active risks. These have translated into potentially excessive tracking error and underperformance.

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Criticism 4: Risk-taking is not necessarily tied to a climate objective

Problematically, these sector deviations create exposure to economic and financial developments that have little to do with corporate decarbonization in itself. For example, an energy underweight changes sensitivity to commodity prices, while over-exposure to lower-intensity companies can alter exposure to the Value or Size factors.

Meanwhile, stock exclusions create a separate source of idiosyncratic risk. Removing a large benchmark constituent leaves a material active position even when sector weights are carefully controlled and replacing that company with others in the same sector cannot fully reproduce its business model or share-price behavior.

Another source of risk-taking unrelated to climate objectives stems from the inclusion of broader ethical or conduct-based exclusions (such as tobacco, controversial weapons or UNGC-based screens) within PAB regulation. While investors have sound reasons to adopt such restrictions, their use does also contribute to benchmark deviation: the associated tracking error should be measured and decomposed.

Criticism 5: A low carbon portfolio does not establish real world decarbonization

While the first four arguments essentially revolve around the potential financial consequences for investors, the fifth concerns extra-financial concerns. In short, a portfolio's emissions characteristics and its contribution to reducing corporate emissions are two different things.

An investor can lower reported portfolio intensity simply by selling a high-emitting company and buying a lower-emitting one: no real-world change occurs. This may involve introducing sector biases of the type discussed above, of course. Yet, even within the same sector, PAB products may systematically exercise a preference for a company that already operates relatively low-emission assets versus one undertaking a substantial transformation to decarbonize operations. It is therefore possible to end up with portfolios that "feel good" because their reported footprint is low, without sufficient evidence that they "do good" by engaging in decarbonization. For an institutional investor wishing to make a claim about contribution, the distinction matters. A declining portfolio indicator is an observable result but its connection to changes in corporate behavior should still be demonstrated.

One challenge faced by investors is the difficulty of interpreting changes in portfolio carbon intensity. An "improvement" could mean a number of different things: companies actually reducing emissions; changes in portfolio weights (including full unwinds of particular stocks); or even just changes in the financial denominator.

Emissions attribution techniques aim to separate financial and portfolio effects from operational progress. SciX's research team has proposed a decomposition method[5] that makes it possible to distinguish between the factors that influence portfolio emissions (sector allocation, intra-sector stock allocation, emissions intensity of the firms, sales, and market capitalization). The model can be used for both historical and cross-sectional analysis to gain a more qualitative view into the decarbonization of a portfolio. Exhibit 4 below provides an example of a cross-sectional emissions attribution exercise, decomposing the difference in carbon intensity between an index and its benchmark into two components: sector allocation and intra-sector stock allocation.

5 - See Bouchet (2023)

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Exhibit 4: Cross-sectional carbon emissions decomposition analysis



Source: SciX analytics platform. The Portfolio has a lower carbon intensity than the Reference. The two cross-sectional drivers of decarbonization are Sector allocation and Stock selection.

The challenge for the next generation of climate mitigation indices

The criticisms of PAB indices are now widely rehearsed. Not all PAB-based products were created equal, of course, and the significance of each point varies depending on the specific index in question. New iterations of PAB (and CTB) indices are evolving. Yet it is increasingly impossible to argue that PAB products could theoretically avoid or neutralize the pitfalls while remaining compliant with regulation. Meanwhile, the next generation of climate investment indices that are not under PAB or CTB labels is also emerging.

Whether choosing to invest in labelled products or unlabelled ones, one takeaway is clear: investors must **assess climate indices on the substance of their construction and outcomes** rather than relying on a name. This includes what drives their reported decarbonization (including how it relates to actual corporate change) and whether their financial characteristics remain compatible with the role they are intended to play in the portfolio. The upcoming instalments of SciX Insights' *Climate Mitigation Series* will consider these crucial questions.

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About Scientific Climate Indices (SciX)

Scientific Climate Indices, or SciX, is an EDHEC Venture and European provider of climate equity indices for institutional investors, asset managers and investment-product providers. SciX translates climate science, climate-risk data and quantitative risk management into investable equity indices. Its approach combines scientifically grounded methodologies with transparent and financially disciplined customization.

SciX has launched two initial index ranges reflecting areas where investor demand is particularly pressing:

- The SciX Physical Climate Resilience Index Series is designed to integrate physical climate risk into core equity allocations. Existing physical-risk climate analytics often rely on highly granular bottom-up approaches that can be difficult to scale for index design across broad investment universes. SciX addresses this challenge through an original top-down framework designed for index construction, which can be enriched with company-level data as well as customized to client-specific requirements. In its Core version, the series targets an average 15% reduction in long-term physical climate risk for around one percentage point of tracking error relative to the benchmark.
- The SciX Climate Mitigation Index Series addresses the need for more pragmatic and financially disciplined approaches to climate mitigation, in response to investors' desire to focus on real-world decarbonization and their disappointment with respect to the first generation of low-carbon indices. The methodology recognizes the limitations and noise in emissions data and trajectories, the structural differences in carbon footprint between economic sectors and the undesirable consequences of broad exclusions. It also recognizes the importance of testing company-level emissions trends against independent external real-world assessments rather than relying mechanically on self-reported information.

For both ranges, SciX has introduced a new series of core indices based on the robust implementation of defined climate objectives designed to remain very close to traditional benchmarks. These core indices can be used as climate-aware building blocks or replacements for traditional capitalization-weighted benchmarks, or as the starting point for further customization.

Where investors require different climate objectives, exclusions or financial constraints, SciX applies a disciplined customization framework, relying on live analytics, backtesting and simulation to assess the financial and climate consequences of design choices before implementation, including benchmark deviation, sector exposures, risk concentrations and portfolio constraints.

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