

# EU Climate Benchmarks

## Paris Aligned or Climate Transition?

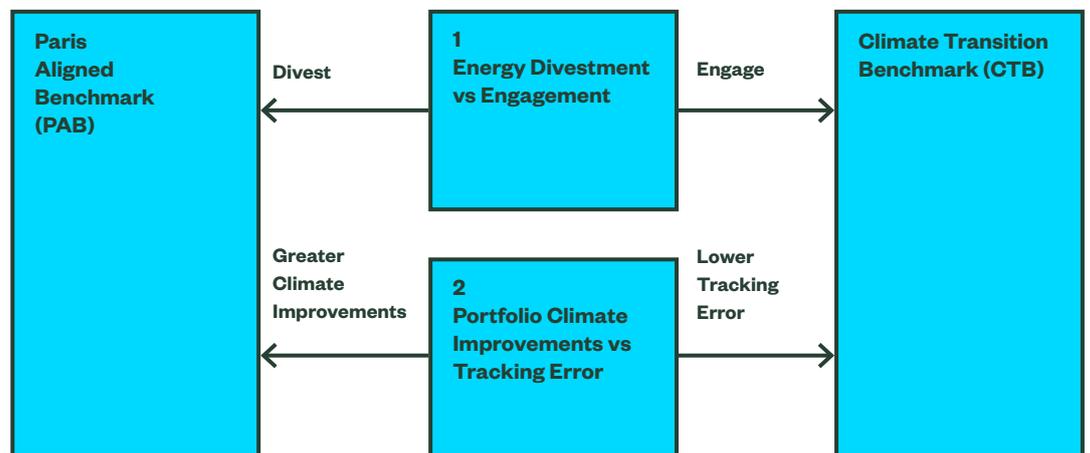
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In our previous paper, [EU Climate Benchmarks: Standards and Implications](#), we looked at the minimum standards and investor use cases for Climate Transition Benchmarks (CTB) and Paris-Aligned Benchmarks (PAB). Next in the series, we discuss aspects investors may consider when deciding between a PAB and a CTB.

The EU defined two climate benchmarks, Climate Transition Benchmarks (CTB) and Paris-Aligned Benchmarks (PAB), to establish minimum standards for indices to align with IPCC's 1.5°C trajectory<sup>1</sup> and net zero in 2050. When deciding between them, investors may consider two important questions: their views on energy divestment versus engagement, and the trade-off between portfolio climate improvements and tracking error.

Figure 1  
**Key Considerations in Selecting Paris Aligned or Climate Transition Benchmark**



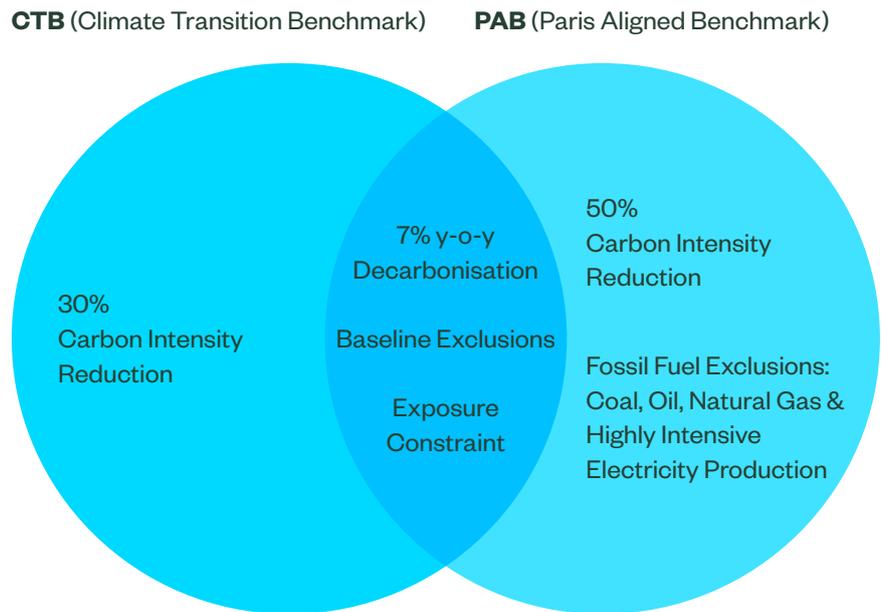
Source: State Street Global Advisors. Figure for illustrative purposes.

Figure 1 maps out an at-a-glance overview, based on our observation that PABs largely exclude energy companies, making them suitable for investors with a strong divestment preference. Alternatively, while CTBs hold energy companies, they heavily reweight them, tilting towards best-in-class so may represent a class of index more suitable than PABs for investors favouring engagement over divestment. In tracking error terms, the 'cost' of greater portfolio climate improvements employed by PABs has been around 20-80 basis points (bps).<sup>2</sup>

## The Benchmarks

At heart, both PABs and CTBs minimum standards are simple: they take the estimated greenhouse gases (GHG) emissions reduction required of the planet to meet climate goals,<sup>1</sup> and apply this to an index that can be leveraged within investors' portfolios. In this sense, they are similar to each other, but they also have significant differences (see Figure 2). For further details, see [EU Climate Benchmarks: Standards and Implications](#), and Appendix 1.

Figure 2  
**EU Climate Benchmark Minimum Standards for Equities<sup>3</sup>**



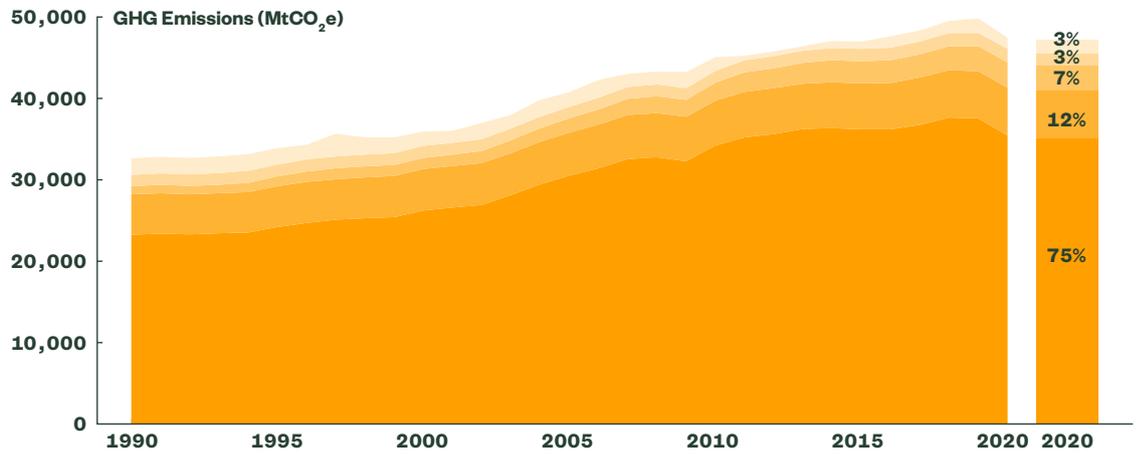
Source: Official Journal of the European Union (2020). Figure for illustrative purposes.

## Consideration 1: Energy Divestment Versus Engagement

The importance of energy is undoubtable in meeting global net zero goals, with around three quarters of global GHG emissions coming from energy (see Figure 3).<sup>4</sup> For investors with decarbonisation goals, the treatment of energy companies within portfolios is, however, less clear. There tend to be two broad alternatives: divest the fossil fuel-based energy companies, or continue to hold them and engage.<sup>5</sup>

Figure 3  
**Energy Accounts for 75% of GHG Emissions**

- Energy
- Agriculture
- Industrial Processes
- Waste
- Land-Use Change and Forestry

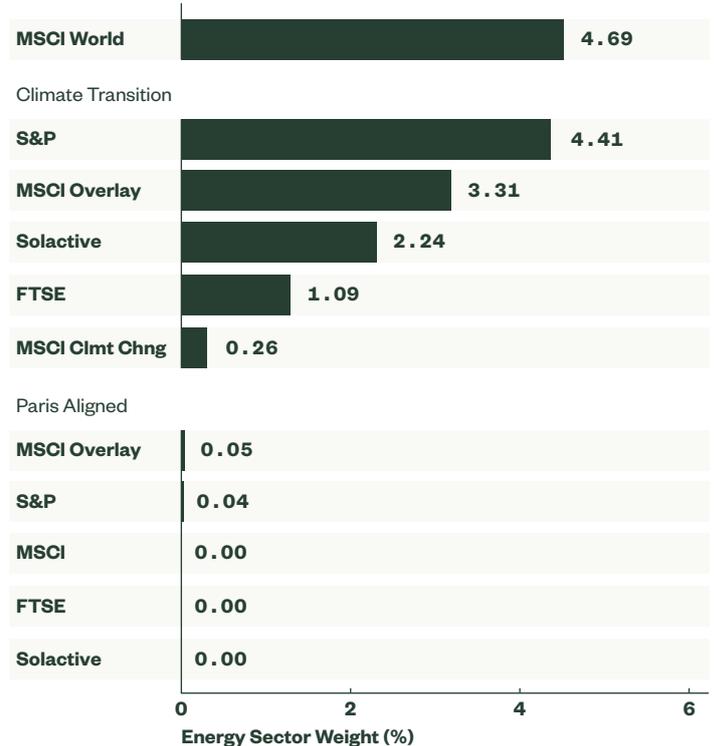
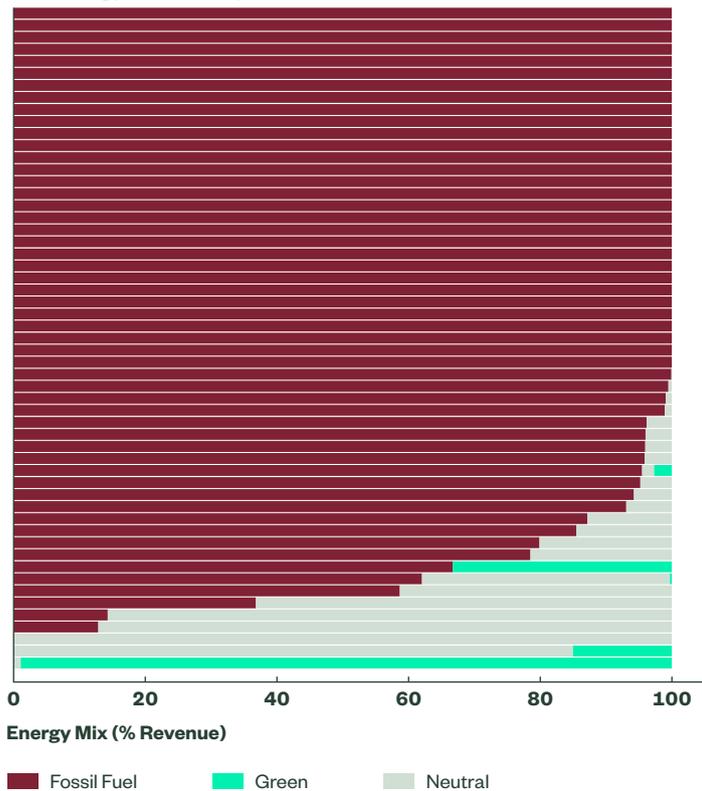


Source: FAOSTAT Emissions Database, OECD & IEA. Data as of 2020. Figure for illustrative purposes.

Within the MSCI World Index, the Energy sector is highly concentrated in fossil fuel-based activities. The left side of Figure 4 represents each energy company, showing their proportion of revenues generated from fossil fuel activities,<sup>6</sup> green activities,<sup>7</sup> and those which are neutral (neither green or from fossil fuels). The vast majority of energy company revenues are fossil fuel-based. On a weighted basis, we approximate 95% of the energy sector's revenues are from fossil fuels, while less than 1% are from green activities.

Figure 4  
**PABs Greatly Exclude the Fossil Fuel-Heavy Energy Sector**

**GICS Energy Sector Companies**



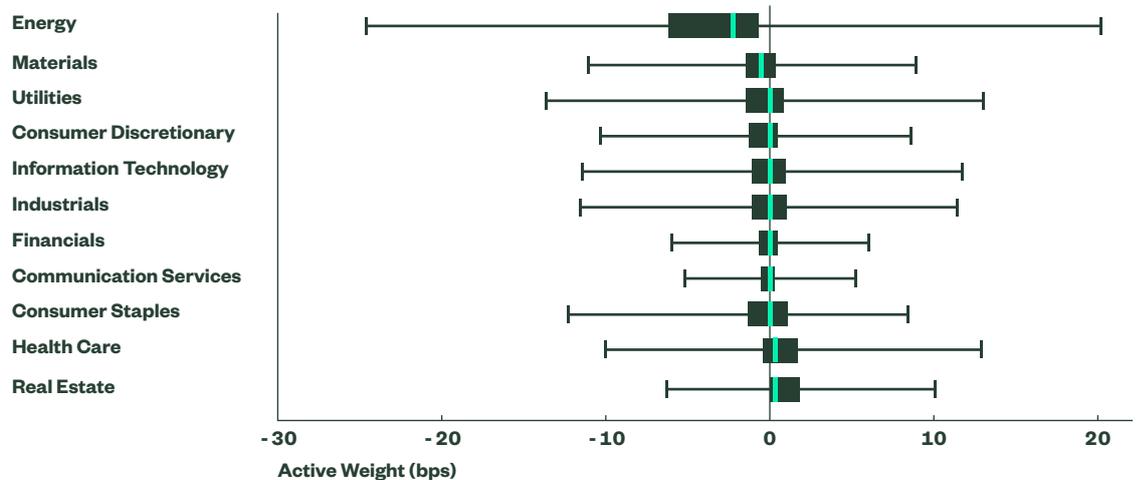
Source: S&P, MSCI, FTSE, Solactive, State Street Global Advisor, 30 June 2023. Figure for illustrative purposes.

Given the fossil fuel-heavy nature of energy companies and the PAB minimum standards, current index offerings show PABs to mostly or totally exclude the energy sector (see Figure 4). There are only two companies held across PAB indices studied in this paper, with the vast majority likely excluded due to PAB exclusion thresholds of 1%+ revenue in coal, 10%+ in oil and 50%+ in natural gas. This approach may be favoured by those investors with strong beliefs around divestment of the energy sector.

Alternatively, CTBs have some weight in energy companies, albeit an underweight position of the sector as a whole (see Figure 4). Consequently, CTBs may be favoured by investors with a preference for shareholder engagement over divestment.

While CTBs still hold energy companies, they do not take the energy challenge lightly. CTBs heavily reweight within the sector — overweighting those which are best-in-class and underweighting those with the poorest climate credentials. We see the energy sector has the largest dispersion<sup>8</sup> of active weights across all sectors (see Figure 5), and by a large margin.<sup>9</sup>

Figure 5  
**Climate Transition Benchmarks Hold, but Heavily Reweight Energy Companies**



Source: S&P, MSCI, FTSE, Solactive, State Street Global Advisors, 30 June 2023. The chart represents the active weights across all CTB indices studied (see Appendix 2 for further details). Outliers are removed from the chart for better visual representation of how indices treat the average stock. Figure for illustrative purposes.

## Consideration 2: Portfolio Climate Improvements Versus Tracking Error

PABs are more ambitious in their goals, requiring an initial 50% GHG reduction as the starting point for decarbonisation, along with their stricter exclusions requirements. Alternatively, CTBs have a more gradual pathway, starting with a lower 30% reduction (see Appendix 6). The greater requirements for PABs mean they are required to be more different from a standard market-cap universe than CTBs, which in turn means greater tracking error is required, assuming all else is equal. In reality, however, not all else is equal.

Tracking error for climate EU Climate Benchmarks, relative to the market-cap weighted market, is dictated by the regulatory minimum standards, other objectives beyond the minimum standards, and also the index construction methodology utilised — far more than only whether it is a PAB or CTB (we examine this further in a later paper). To isolate the tracking error difference (albeit imperfectly<sup>10</sup>) between a PAB and CTB, we compare indices from the same provider, where each pair of indices has the same index construction method and similar constraints<sup>11</sup> (see Figure 6).

The two MSCI Overlay indices minimise tracking error subject to meeting the regulatory minimum standards. These can be interpreted as an approximation of the lowest tracking error possible while meeting the PAB or CTB label, over this period.<sup>12</sup> Consequently, this is likely the closest comparison of the true tracking error impact of meeting PAB minimum standards relative to a CTB equivalent, of the indices assessed. Here, the PAB had 62bps greater tracking error than the CTB — over double that of the comparable CTB. Across providers, the difference in tracking error between similar PAB to CTB indices was around 20–80bps. This is the ‘cost’ of greater portfolio climate improvements, from an active risk perspective. We also see that PABs do not necessarily have a lower tracking error than CTBs, with the index construction method and additional features appearing to play a significant role.

Figure 6

**Paris Aligned Benchmarks Greater Decarbonisation & Tracking Error**



Source: S&P, MSCI, FTSE, Solactive, State Street Global Advisor, 30th June 2023. Tracking errors are relative to the MSCI World Index. Figure for illustrative purposes.

There is a trade-off between portfolio climate improvements and index targets and the tracking error incurred relative to cap weighting. This gives investors a choice of aligning with a 1.5°C pathway and net zero, with different levels of tracking error. It should also be noted that tracking error may increase over time, if the underlying index fails to decarbonise (see our paper, [EU Climate Benchmarks Standards and Implications](#), for further details).

**The Bottom Line**

The EU defined two benchmarks, PABs and CTBs, to establish minimum standards for indices to align with IPCC’s 1.5°C trajectory, and net zero in 2050. When choosing between a PAB or CTB, we see two key considerations investors can use to guide their choice: views on divestment vs engagement and how they trade-off between portfolio climate improvements and tracking error.

The MSCI World’s Energy sector is largely a fossil fuel sector, which is mostly or entirely excluded within PABs due to their minimum standards. These offer a solution for investors who hold strong beliefs in divestment over engagement. For those who believe in engagement, the CTBs would likely be a more suitable option that hold energy companies, but heavily reweighted towards best-in-class energy companies.

Regarding portfolio climate improvements, PABs are more ambitious in their climate goals, but this comes with the trade-off of greater tracking error: around 20–80 bps more than their CTB counterparts.

## Appendix

### Appendix 1: EU Climate Benchmark Minimum Standards

Minimum Standards	EU Climate Transition Benchmark (CTB)	EU Paris Aligned Benchmark (PAB)
<b>Risk oriented minimum standards</b>		
Minimum Scope 1+2(+3) <sup>13</sup> carbon intensity reduction compared to investable universe	30%	50%
Scope 3 phase-in	Up to 4 years from 23rd December 2020	
Baseline Exclusions	Controversial Weapons Societal norms violators <sup>14</sup> Tobacco	
Activity Exclusions	No	Coal (1%+ revenues) Oil (10%+ revenues) Natural Gas (50%+ revenues) Electricity producers with carbon intensity of lifecycle GHG emissions higher than 100gCO <sub>2</sub> e/kWh (50%+ revenues)
<b>Opportunity oriented minimum standards</b>		
Year-on-year self-decarbonisation of the benchmark	At least 7% on average per annum: in line with or beyond the decarbonisation trajectory from the IPCC's 1.5°C scenario (with no or limited overshoot)	
Minimum green share/brown share ratio compared to investable universe (voluntary)	At least equivalent	Significantly larger (factor 4)
Exposure constraints	Minimum exposure to sectors highly exposed to climate change issues is at least equal to equity market benchmark value	
Corporate Target Setting (voluntary)	Weight increase shall be considered for companies which set evidence-based targets under strict conditions to avoid greenwashing (see Article 9 in section 5.12 re conditions)	
Disqualification from label if 2 consecutive years of misalignments with trajectory	Immediate	
<b>Relevance oriented minimum standards</b>		
Review Frequency:	Minimum requirements shall be reviewed every three years to recognise market development as well as technological and methodological progress.	

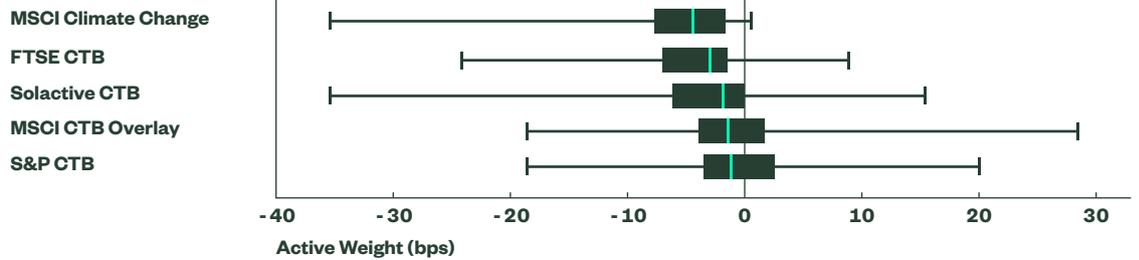
Source: Official Journal of the European Union (2020) & EU TEG Final Report, (2019).

### Appendix 2: Indices Assessed

Abbreviated Index Name	Official Index Name	Index Provider	EU Benchmark
Solactive PAB	Solactive ISS ESG Developed Markets Paris-Aligned Benchmark Index	Solactive	PAB
Solactive CTB	Solactive ISS ESG Developed Markets Climate Transition Benchmark Index	Solactive	CTB
S&P PAB	S&P Developed Ex-Korea LargeMidCap Net Zero 2050 Paris-Aligned ESG Index	S&P Dow Jones Indices	PAB
S&P CTB	S&P Developed Ex-Korea LargeMidCap Net Zero 2050 Climate Transition ESG Index	S&P Dow Jones Indices	CTB
MSCI PAB	MSCI World Climate Paris Aligned Index	MSCI	PAB
MSCI PAB Overlay	MSCI World EU PAB Overlay Index	MSCI	PAB
MSCI Climate Change	MSCI World Climate Change Index	MSCI	CTB
MSCI CTB Overlay	MSCI World EU CTB Overlay Index	MSCI	CTB
FTSE PAB	FTSE Developed ex Korea ex Poland Paris-aligned (PAB) Index	FTSE Russell	PAB
FTSE CTB	FTSE Developed ex Korea ex Poland Climate Transition (CTB) Index	FTSE Russell	CTB

Source: S&P, MSCI, FTSE, Solactive, State Street Global Advisor, 30th June 2023.

### Appendix 3: Energy Sector Active Stock Weights per Index



Source: S&P, MSCI, FTSE, Solactive, State Street Global Advisor, 30th June 2023. The chart represents the active weights across all CTB indices studied (see Appendix 2 for further details). Outliers are removed from the chart for better visual representation of how indices treat the average stock. Figure for illustrative purposes.

### Appendix 4: Distribution of Active Weights Across Whole Universe for CTB Indices

	Solactive CTB	S&P CTB	MSCI CTB Overlay	MSCI Climate Change	FTSE CTB
Mean	0	0	0	0	0
Std	7.33	6.13	4.41	14.46	17.82
Min	-210.4	-74.21	-74.21	-74.21	-89.17
25%	-0.42	-1.16	-0.67	-0.61	-1.98
50%	0.57	0	0	-0.03	-0.72
75%	1.82	0.78	1.3	0.24	0
Max	29.69	76.17	28.61	432.79	508.78
Skew	-18.26	0.23	-7.54	23.46	16.69
kurtosis	453.55	54.7	100.97	660.45	419.49

Source: S&P, MSCI, FTSE, Solactive, State Street Global Advisor, 30th June 2023. The chart represents the active weights across all CTB indices studied (see Appendix 2 for further details). Data is shown in basis points. Figure for illustrative purposes.

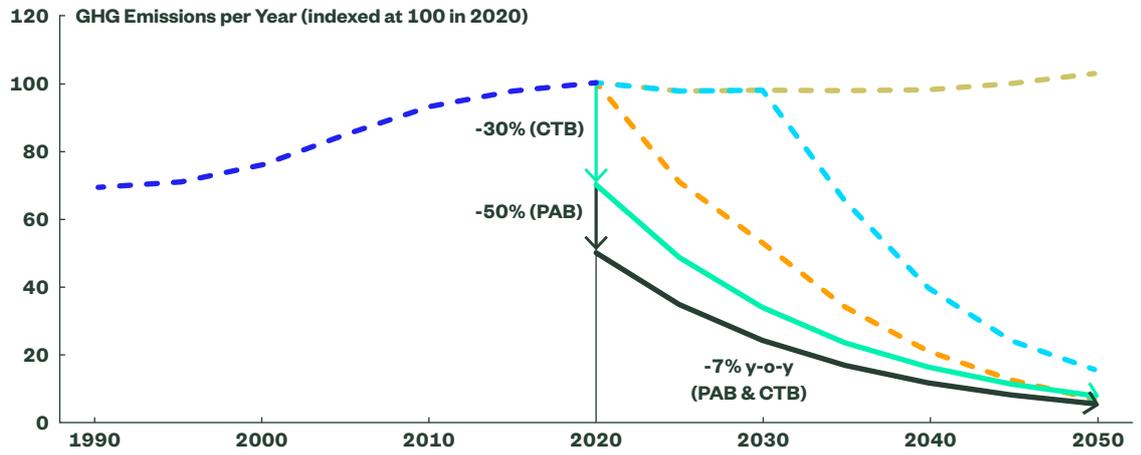
### Appendix 5: Distribution of Active Weights of Energy Stocks for CTB Indices

	Solactive CTB	S&P CTB	MSCI CTB Overlay	MSCI Climate Change	FTSE CTB
Mean	-4.29	-0.49	-2.42	-7.77	-6.31
Std	14.57	18.18	12.79	12.32	14.12
Min	-74.21	-74.21	-74.21	-74.21	-74.21
25%	-6.11	-3.47	-4.02	-7.67	-7.15
50%	-1.91	-1.13	-1.52	-4.45	-3.02
75%	0.14	2.46	1.63	-1.81	-1.58
Max	15.52	65.74	28.61	0.53	42.67
Skew	-2.68	-0.53	-3.27	-3.76	-2.01
kurtosis	10.21	7.78	18.39	16.48	12.67

Source: S&P, MSCI, FTSE, Solactive, State Street Global Advisor, 30th June 2023. The chart represents the active weights across all CTB indices studied (see Appendix 2 for further details) for energy companies. Data is shown in basis points. Figure for illustrative purposes.

Appendix 6:  
EU Climate  
Benchmarks Applies  
What is Required  
of the Planet, to  
Portfolios

- PAB
- CTB
- Historical Pathway
- Current Policies
- Delayed Transition
- Net Zero 2050



Source: IIASA (2022), NGFS Scenario Explorer hosted by IIASA & Official Journal of the European Union (2020). Figure for illustrative purposes.

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## Endnotes

- 1 IPCC's 1.5°C trajectory with no or limited overshoot. This is within the Paris Agreement goal of 'well below 2°C above preindustrial levels' (United Nations, 2015).
- 2 This figure is relative to the MSCI World Index from 1 July, 2022 to 30 June, 2023, based on daily returns.
- 3 There are also voluntary elements of the regulation, including a green/brown improvement within PABs and no worse within CTBs, alongside an overweight of companies with Science Based Targets.
- 4 When we translate the global energy emissions to the corporate level, this is akin to the scopes 1+2+3 emissions of energy companies, and a small number of diversified mining companies, within a portfolio. The use-of-products category of companies downstream scope 3 emissions is a major contributor, as fossil fuels will always emit emissions once burned by the ultimate consumer (Hoepner & Schneider, 2022). We acknowledge there are different way to classify emissions, with the method employed by the FAOSTAT Emissions Database classifying energy used in industry, transport and buildings ultimately as energy related. The 75% figured incorporates these activities within the estimation.
- 5 At State Street Global Advisors, we engage to promote best practice and transparent disclosure of material risks and opportunities across a range of topics, including sustainability factors, that we believe would have the most material impact on the long-term value of our clients' assets. Our [asset stewardship approach](#) is outlined (Colton & Younis, 2023).
- 6 Fossil fuel activities are based on S&P Global Trucost sector data, using the following sectors: "All other petroleum and coal products manufacturing", "Bituminous Coal and Lignite Surface Mining", "Bituminous Coal Underground Mining", "Pipeline transportation", "Crude Petroleum and Natural Gas Extraction", "Petroleum refineries", "Petroleum, Chemical, and Allied Products Wholesalers", "Petroleum lubricating oil and grease manufacturing", "Support activities for oil and gas operations", "Mining and oil and gas field machinery manufacturing", "Drilling oil and gas wells", "Tar Sands Extraction", "Natural gas distribution", "Industrial gas manufacturing", "Natural Gas Liquid Extraction", "Coal Power Generation", "Petroleum Power Generation", "Natural Gas Power Generation", "Biomass Power Generation". These are the same sectors used within the S&P PAB & CTB Indices for identifying revenues linked to the required fossil fuel exclusions for PABs.
- 7 Green activities are based on the FTSE Russell Green Revenue data.
- 8 As measured by the mean absolute deviation, which measures dispersion in a manner that reduces the influence of outliers relative to other methods such as standard deviation. Energy companies have a mean absolute active weight deviation of 7.7bps, almost 3x the value for all companies (2.6bps) and over 1.8x of the next highest sector (4.2bps).
- 9 This is also largely consistent across indices. Please see Appendix 3 for visual representation of this. Appendix 4 shows summary statistics for the active weights across the whole universe, while Appendix 5 shows the summary statistics of the active weights for energy companies.
- 10 Some PABs have further exclusions or different objectives (e.g. greater improvements in metrics not mandated by the EU Climate Benchmark minimum standards) which makes this an imperfect comparison.
- 11 We did also assess the MSCI PAB and MSCI Climate Change indices, but these are very different methodologies, so we omitted them from the analysis as not to skew the results.
- 12 This is an approximation for multiple reasons. Firstly, as the index takes into account practical portfolio management considerations such as liquidity and turnover. Without these, the tracking error of the index may be lower, at the expense of practical implementation such as transaction costs, when implemented in live portfolios. Secondly, the indices minimise ex-ante tracking error, which is a model of expected future tracking error. As with any model, the future will likely not play out precisely in line with expectation.

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\* Pensions & Investments Research Center, as of December 31, 2022.

† This figure is presented as of December 31, 2023 and includes approximately \$64.44 billion USD of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated.

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