

Temperature Scores: A Guide to Climate Alignment Metrics

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In recent years, temperature alignment data for corporate issuers has become increasingly available in the sustainability data market. This paper aims to explore these metrics, explaining their construction, comparing methodologies of leading third-party data providers, and assessing their alignment with industry best practices. We also present empirical findings using these datasets in common public equity universes and discuss considerations for investors looking to incorporate these metrics into their decision-making processes.

What is temperature alignment?

Temperature alignment scores provide a way to compare companies' emissions reduction targets on a standardised scale. These scores, also known as Implied Temperature Rise (ITR) or Paris Alignment, estimate the global temperature rise associated with a company's or portfolio's greenhouse gas emissions trajectory. This can allow investors to assess whether a company's emission reduction efforts align with the goals of the Paris Agreement.

The need for such scores arises from the wide variation in companies' emissions reduction targets. These targets can vary quite widely in terms of the target date, level of improvement, the scope of emissions, and the exact emissions metric being targeted (economic intensity, physical intensity, or absolute emissions), among others.

Given these variations, along with regional and sectoral differences, comparing targets across companies can be challenging. Temperature alignment scores help address this challenge by translating diverse targets into a single, intuitive metric.

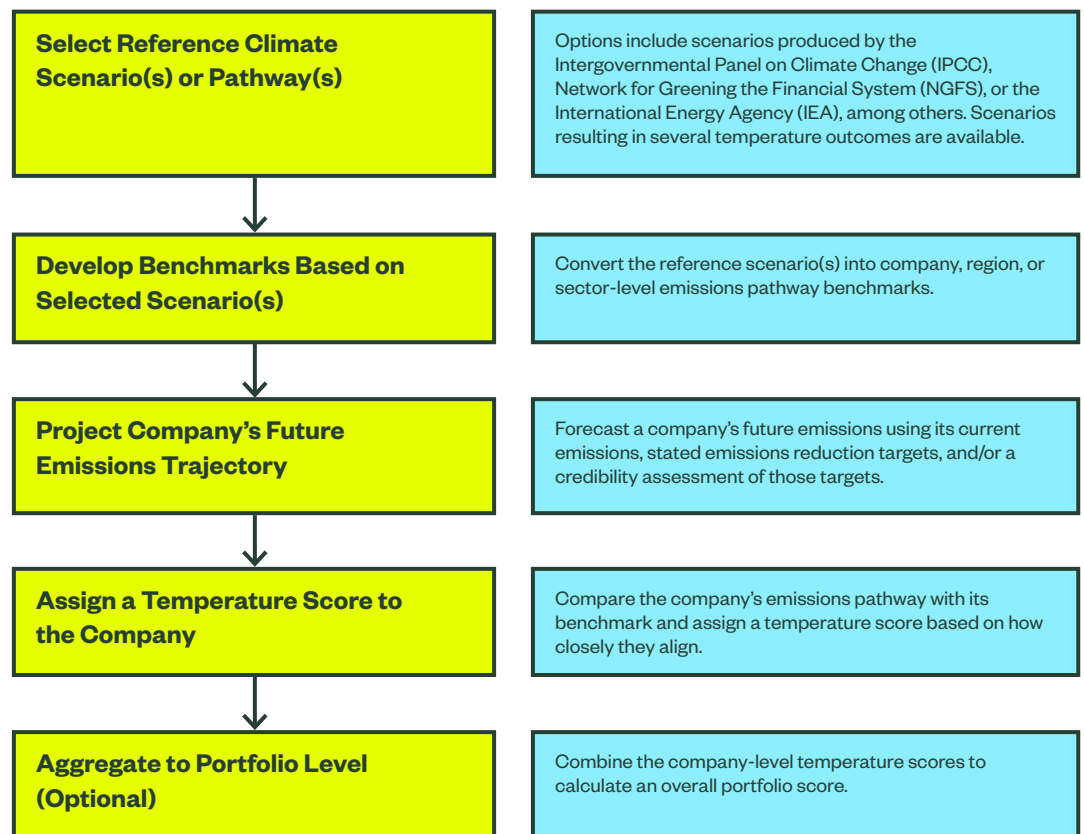
By using temperature alignment scores, investors can:

- Compare companies' climate targets across different sectors and regions
- Assess whether a company or portfolio aligns with global climate goals
- Identify potential climate-related risks and opportunities in their investments
- Set and monitor progress towards portfolio-level climate targets

In the following sections, we'll explore how these scores are calculated, compare methodologies from leading providers, and discuss their practical applications for investors.

What are the general steps to calculate portfolio alignment?

A generalised outline for calculating temperature scores is as follows:



How are climate portfolio alignment scores calculated? Examples from MSCI and ISS

To illustrate how these scores are calculated in practice, we compare the methodologies of two major providers: MSCI and ISS. While both aim to measure temperature alignment, their approaches differ in key areas, as outlined below¹:

Criteria	ISS	MSCI
Coverage (# of Companies)	30,000+ companies	16,000+ companies
Data History	2022 onwards	2022 onwards
Update Frequency	Monthly	Monthly
Which reference scenarios are used?	Multiple scenarios from the IEA: Sustainable Development Scenario (SDS), Stated Policy Scenario (STEPS), and Current Policies Scenario (CPS).	A single scenario from the NGFS: Net Zero 2050 scenario based on the Regional Model of Investment and Development (REMIND) model.
How are the benchmarks constructed?	Emissions pathways for each sector are derived based on IEA scenarios. Each company is allocated a carbon budget based on its market share and the expected emissions trajectory of its sector.	Emissions pathways for each sector and region are derived based on the REMIND Net Zero 2050 scenario. Each company is allocated a carbon budget based on a revenue breakdown by sector and region.
How are future company emissions projected?	Company emissions are projected using its historical emissions trend, and, if relevant, SBTi-approved and other voluntary corporate targets, adjusted based on a credibility assessment.	Company emissions are projected using historical emissions level and stated climate targets, adjusted based on a credibility assessment. If targets are not disclosed or assessed as not credible, emissions are assumed to grow by 1% every year.
How is a company temperature score calculated?	A company's emissions are compared to the reference level in 2050 under the SDS scenario. Based on the level of over/undershoot, a temperature score is determined, capped between 1.5°C to 6°C, at steps of 0.1°C.	A company's total projected emissions from the reference year to 2050 are compared to its assigned budget. The company's ITR is calculated based on how much it exceeds (or falls below) this budget. The formula uses a base temperature of 1.55°C, adjusted by the company's relative over/undershoot multiplied by the remaining global 1.55°C carbon budget and a factor relating CO ₂ emissions to global mean temperature change.
How is a portfolio temperature score calculated?	The portfolio temperature score is calculated by comparing the portfolio-owned ² projected emissions in 2050 with the available owned carbon budgets for SDS, STEPS, and CPS scenarios. The final score is interpolated between the two nearest scenario temperature thresholds based on the respective overshoot. The reference temperature for each scenario is as follows: SDS (1.5°C), STEPS (2.7°C), and CPS (3.2°C).	A portfolio's total financed overshoot and financed budget are calculated. ³ The portfolio ITR is then calculated using a similar approach to the company ITR calculation, with some nuances in the process omitted here for brevity. ⁴

These methodological differences can lead to varying temperature scores for the same company or portfolio, highlighting the importance of understanding each provider's approach when interpreting and comparing scores.

Industry best practices and an assessment of providers' alignment

With the increasing awareness and availability of portfolio alignment metrics, industry best practices and guidance have evolved over the past few years. The Taskforce for Climate-related Financial Disclosures' (TCFD) Portfolio Alignment Team (PAT) published key documents in 2020⁵ and 2021⁶, covering various methods of portfolio alignment measurement and technical considerations for practitioners.

Building on this work, the Glasgow Financial Alliance for Net Zero (GFANZ) published guidance in 2022.⁷ This guidance is considered the current industry best practice for portfolio alignment metrics, including temperature scores. However, it's important to note that the guidance applies to a broader class of "portfolio alignment" metrics, of which temperature scores are just one example.

In this section, we assess the MSCI and ISS temperature score methodologies against the GFANZ’s recommended criteria.⁸ The table below provides a summary of our assessment:

Judgement Criteria	GFANZ Recommendation Summary	ISS	MSCI
What type of benchmark should be built?	Use a single scenario with a fair share carbon budget approach.	Aligned	Aligned
How should benchmark scenarios be selected?	Select a 1.5°C scenario and prioritise granular regional and sectoral benchmarks.	Aligned	Aligned
Should absolute emissions, production, or emission intensity units be used?	Production intensities are preferred for homogenous sectors. For others, absolute emissions are preferred.	Partially Aligned	Partially Aligned
What scope of emissions should be included?	Include Scope 3 emissions when more than 40% of the company’s overall emissions or if the absolute magnitude is large.	Aligned	Aligned
How should emissions baselines be quantified?	Consider the Partnership for Carbon Accounting Financials (PCAF) Standard for quantifying emissions. Prefer activity-based estimation methods over top-down methods.	Aligned	Aligned
How should forward-looking emissions be estimated?	Incorporate target credibility assessment using a combination of backward and forward-looking data.	Aligned	Aligned
How should alignment be measured?	Assess alignment on cumulative emissions basis over short- and medium-term time horizons (e.g. 2030). Temperature scores are preferred for longer-term horizons (e.g. 2050).	Aligned	Aligned
How should alignment be expressed as a metric?	The temperature metric is suitable for long-term time horizons, using either multiple benchmarks interpolation or a TCORE ⁹ multiplier.	Aligned	Aligned
How should company-level alignment outcomes be aggregated?	An aggregated budget approach is recommended.	Aligned	Aligned

In our assessment, although specific methodologies differ, the two data providers assessed here are largely in alignment with industry best practice recommendations. Further details of our assessment are available on request.

Empirical Analysis

In this section, we present some empirical analysis of the temperature scores provided by ISS and MSCI for key equity indices. All data presented is as of June 2024 for index holdings and temperature scores.

Index	No. of Companies	ISS (%)		MSCI (%)	
		By Count	By Weight	By Count	By Weight
ACWI IMI ¹⁰	8,889	92.5	97.4	95.7	98.7
World ¹¹	1,441	98.1	98.2	99.4	98.7
EM ¹²	1,333	90.1	92.9	98.3	99.5
ACWI ¹³	2,774	94.3	97.5	98.9	98.8

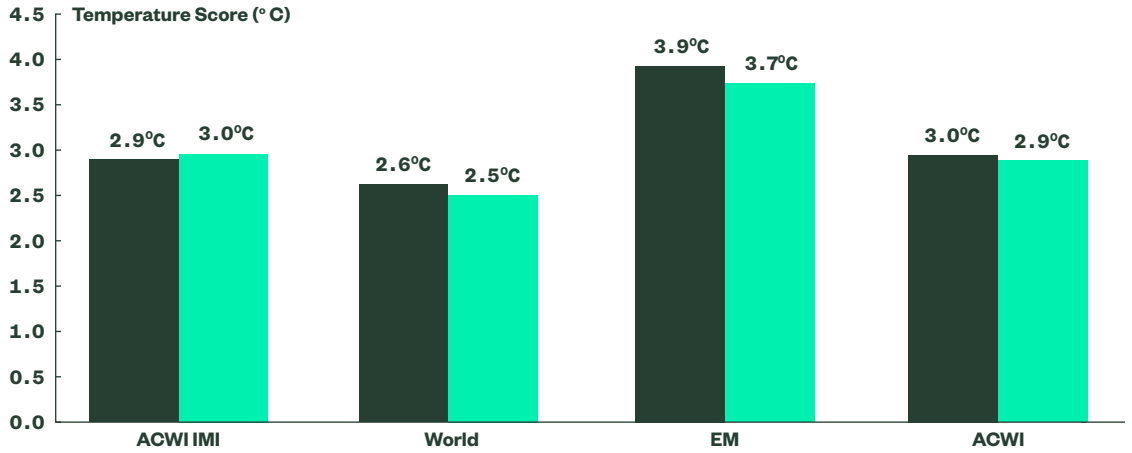
Source: State Street Global Advisors, MSCI, ISS as of June 2024.

Overall coverage across the four major indices is good, with MSCI data showing better coverage of emerging markets.

The figure below shows the overall temperature scores for these four major indices:

Figure 1
Major Indices —
Temperature Scores

ISS
MSCI



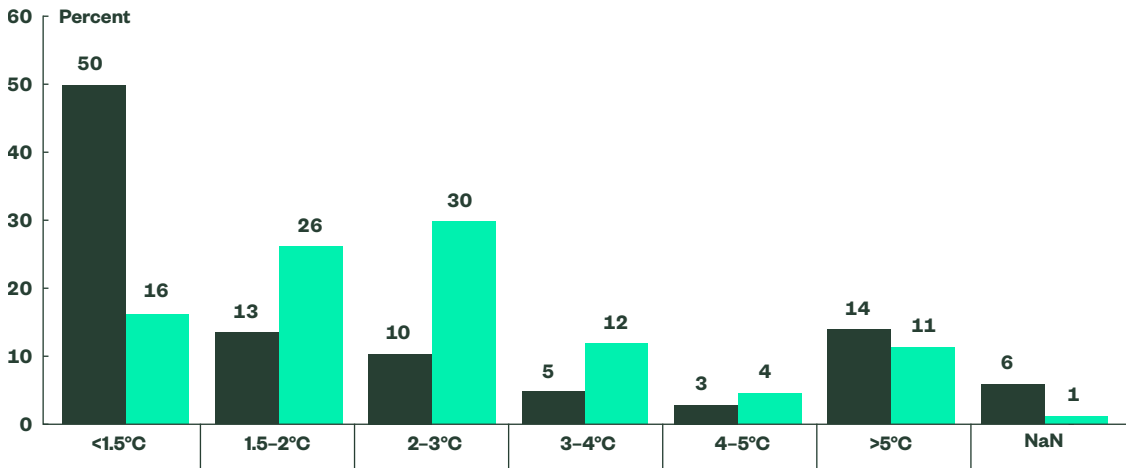
Source: State Street Global Advisors, MSCI, ISS as of June 2024.

Though minor differences exist, we find that both providers broadly agree on the overall scores.

Focusing on the MSCI ACWI index, we examine the distribution of temperature scores between the two providers:

Figure 2
ACWI — Distribution of
Temperature Scores

ISS
MSCI



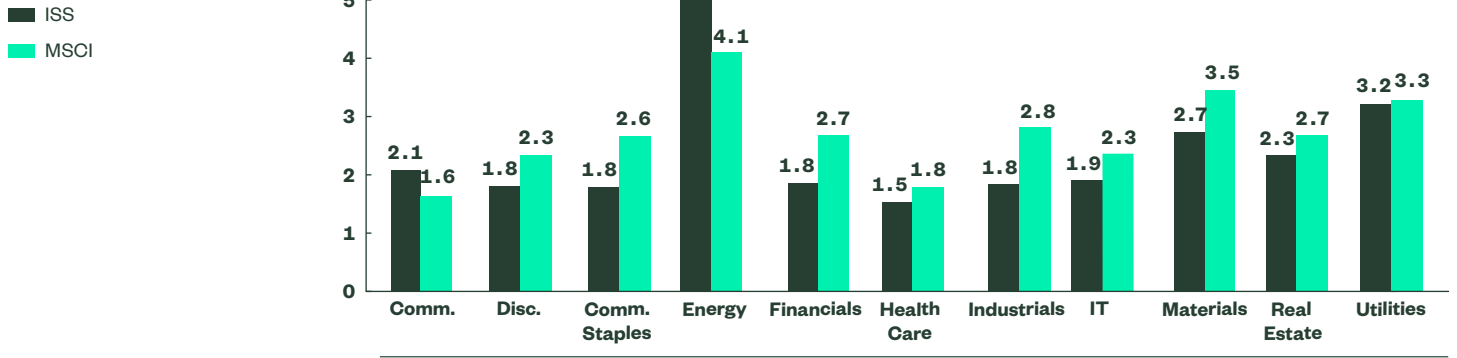
Source: State Street Global Advisors, MSCI, ISS as of June 2024.

We find there are some key differences:

- A higher proportion of companies (by count) are assessed as being 1.5°C aligned by ISS (50%) versus MSCI (16%).
- A higher proportion of companies (by count) are assessed as being between 2-4°C aligned by MSCI (56%) versus ISS (23%).

Sticking with the MSCI ACWI index, comparing the sector-level portfolio temperature scores shows some divergence between the two providers. Utilities and healthcare show similar temperature scores, while sectors such as energy, financials, and industrials show meaningful divergence.

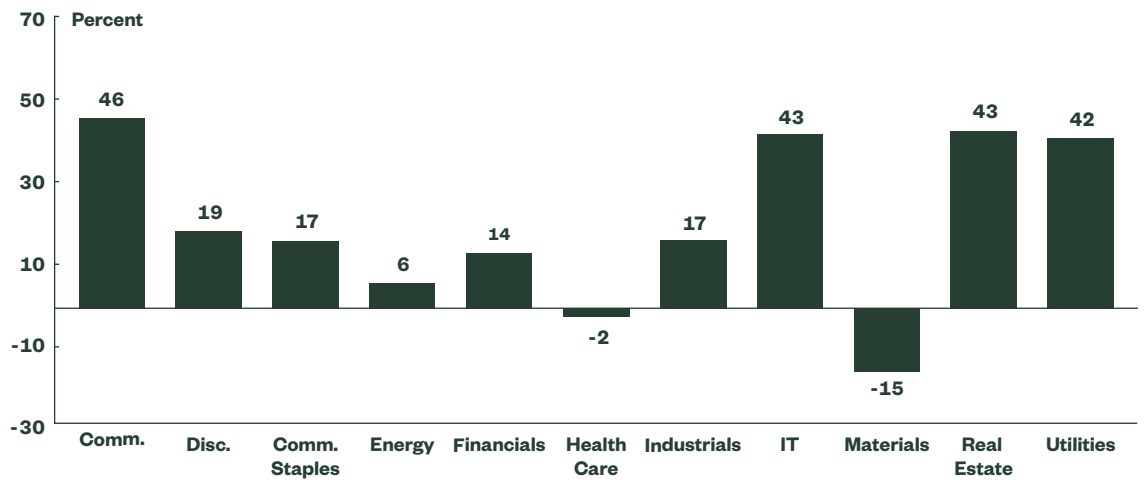
Figure 3
ACWI — Sectors
Temperature Score



Source: State Street Global Advisors, MSCI, ISS as of June 2024.

Looking more closely at individual GICS sectors, we observe a fairly low Pearson correlation coefficient for temperature scores provided by ISS and MSCI.

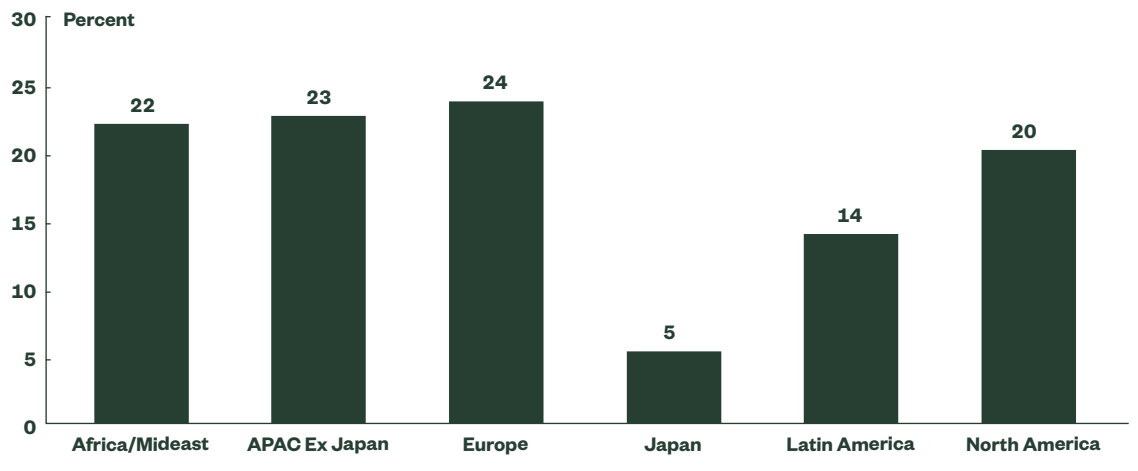
Figure 4
ACWI — Sector
Correlation



Source: State Street Global Advisors, MSCI, ISS as of June 2024.

Similarly, we also observe a low Pearson correlation coefficient for temperature scores across different regions.

Figure 5
ACWI — Region
Correlation



Source: State Street Global Advisors, MSCI, ISS as of June 2024.

These differences highlight the importance of understanding methodology when interpreting and comparing temperature scores.

What are the use cases for investors?

Temperature score metrics offer several practical applications for investors:

1 Reporting:

Investors can use temperature scores to communicate their portfolio's potential emissions trajectory to stakeholders using an intuitive metric, demonstrating alignment (or misalignment) with the goals of the Paris Agreement. This can be particularly useful for annual sustainability reports or client communications.

2 Engagement:

These scores can provide a basis for discussions with company management about their climate strategies and targets. Investors can use the scores to prioritise engagement efforts, focusing on companies with higher temperature scores or those misaligned with portfolio goals.

3 Target Setting:

Investors can set portfolio-level temperature targets (e.g. "align our portfolio with a 2°C scenario by 2030"). This may be relevant for investors with broad net zero or climate goals.

4 Investment Decision-making:

For investors looking to integrate temperature scores into their investment processes, this potentially can be used to research companies' emissions targets, tilt portfolios toward more climate-aligned companies, or implement exclusion strategies for high-temperature companies.

Temperature Scores: Key Strengths and Limitations

Before examining how temperature scores compare to other metrics, we summarise their key benefits and challenges:

Key Strengths	Key Limitations
Forward-looking assessment of climate alignment	Relies on company-reported data and targets
Intuitive, comparable measure across portfolios	Different provider methodologies can lead to varying scores
Clear link to global climate goals	Long-term projections involve significant uncertainty
Useful for target-setting and engagement	Single number might oversimplify complex climate strategies
Supports stakeholder communication	Lack of industry standardisation

How do Temperature Scores differ from Climate Value at Risk Metrics?

Investors familiar with the climate data landscape may seek to further understand differences between temperature scores and climate value at risk (CVaR) metrics.¹⁴ While both can be considered proxies for measuring transition risk, they ultimately measure different aspects of it.

CVaR seeks to measure the quantified risk to company value by assuming a climate scenario and estimating the associated risk to company valuation under that scenario (this often ignores a company's emission reduction goals). On the other hand, temperature scores estimate the temperature associated with a company's future emissions, accounting for stated emissions reduction targets or making estimations for future emissions when a company does not have a target.

Both metrics can provide valuable, complementary insights for investors assessing climate-related risks and opportunities in their portfolios.

Conclusion

While temperature scores can be intuitive to understand and may be easy to communicate, the methodologies underlying such metrics are complex and need to be understood. Our analysis has shown that even though providers can broadly be aligned with industry best practices, the scores can differ at a granular level due to different modeling assumptions. This may also be due to the short history that is available, and a resultant lack of standardisation in the market.

However, in our view, these scores have the potential to provide complementary information relative to other types of climate data metrics and, importantly, provide a forward-looking opinion of a company's emissions trajectory. As such, temperature scores can be a useful addition to an investor's toolkit for assessing companies' climate transition risk and are intuitive to understand and communicate.

If you want to learn more, please reach out to a SSGA representative to explore our sustainable investing solutions and capabilities integrating climate metrics.

Endnotes

- 1 Sourced from ISS Climate Scenario Alignment and MSCI Implied Temperature Rise methodology documents respectively.
- 2 Calculated for each company as: (Value of portfolio holdings)/(Adjusted Enterprise Value) *(Projected emissions). Portfolio-owned projected emissions are an aggregation of all companies in the portfolio. Similar calculation is followed for the portfolio budget.
- 3 Calculated for each company as: (Value of portfolio holdings)/(Enterprise Value in Cash) * (Emissions over/undershoot). Portfolio financed overshoot is an aggregation of all companies in the portfolio. Similar calculation is followed for the portfolio financed budget.
- 4 Further details are available on request.
- 5 [PAT-Report-20201109-Final.pdf \(tcfhub.org\)](#)
- 6 [PAT_Measuring_Portfolio_Alignment_Technical_Considerations.pdf \(tcfhub.org\)](#)
- 7 [Measuring-Portfolio-Alignment-Enhancement-Convergence-and-Adoption-November-2022.pdf \(bbhub.io\)](#)
- 8 Technical details related to the specific guidance are left out for brevity, however are available in full at the document links provided.
- 9 Transient Climate Response to cumulative Emissions of carbon dioxide (TCRE) is the ratio of the globally averaged surface temperature change per unit carbon dioxide (CO₂) emitted. MSCI use the value 0.00045°C per ton of CO₂e.
- 10 MSCI ACWI Investable Market Index (IMI).
- 11 MSCI World Index.
- 12 MSCI Emerging Markets Index.
- 13 MSCI All Country World Index (ACWI).
- 14 For more details, please see our papers explaining various [transition risk](#) and physical value at risk metrics.

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* Pensions & Investments Research Center, as of December 31, 2023.

[†]This figure is presented as of September 30, 2024 and includes ETF AUM of \$1,515.67 billion USD of which approximately \$82.59 billion USD in gold 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. Please note all AUM is unaudited.

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