SUSTAINABLE RESEARCH SERIES

TICKERS AND THERMOMETERS: DECODING THE COMPLEXITIES OF PORTFOLIO TEMPERATURE ALIGNMENT

CONTENTS

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INTRODUCTION

With the release last March of the final installment of the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)[1], this year marks a turning point in the global climate change narrative. Across its nearly 10,000 pages, the highest authority on climate change science brought into sharp focus the pressing reality that global warming is now more likely than not to reach 1.5°C in the near to medium term. The final installment fed the United Nations Framework Convention on Climate Change (UNFCCC) Global Stocktake report[2] which highlights that the 1.5° C trajectory now requires global emissions to fall by 43% by 2030 vs. 2019 levels and 60% by 2035. In the aftermath of both landmark reports, the role of financial institutions has never been more crucial, and the financial sector has found itself further thrust into the epicenter of the action. The influence of the finance industry over global capital allocation provides it with a unique opportunity to drive the transition towards a sustainable, low-carbon economy. This, alongside ever-stricter global regulations, is leading to an increasing number of institutions pledging alignment with the Paris Agreement.

However, the journey towards 'Net Zero' is complex. As the window of opportunity to keep global warming below 1.5°C narrows, investors are grappling with one of the most critical tools in their climate strategy toolkit: portfolio temperature assessment. This measure is more than a mere symbol of the environmental impact of a portfolio – it is a tangible reflection of the potential degree of global warming that the emissions from the underlying investments could cause.

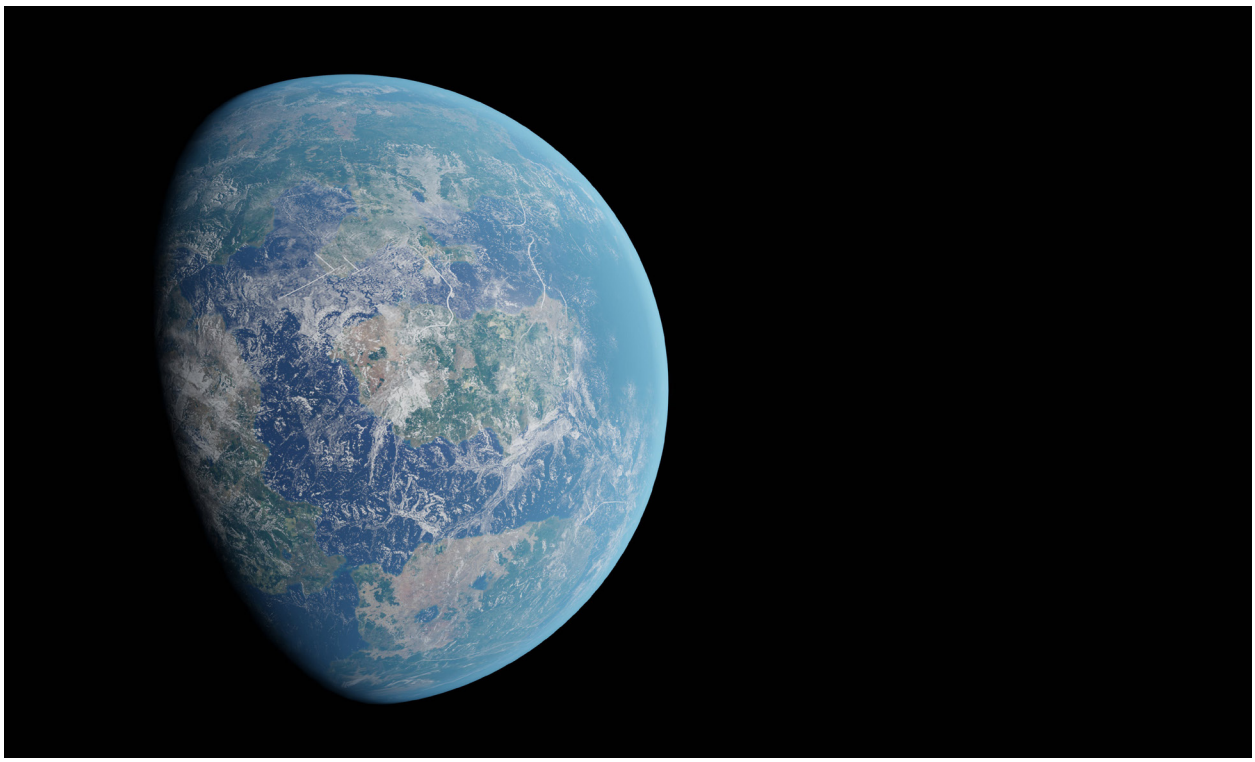
The portfolio 'temperature' provides investors with insights that are crucial on several fronts. First, it offers a means to monitor and measure progress towards decarbonisation targets. Regular temperature assessments can serve as a performance tracker, allowing investors to gauge whether a portfolio is on track towards achieving 'Net Zero'. Secondly, assessments help identify and mitigate climate-related financial risks. A portfolio skewed towards high-emitting assets is not only environmentally unsound but could also face significant financial risks – regulatory, market, reputational and litigation – in a world transitioning towards lower carbon alternatives. Lastly, a robust temperature assessment can enhance accountability and transparency, addressing the rising demand of stakeholders for comprehensive climate disclosures and ethical investments.

However, determining a portfolio's temperature is not a straightforward task. The absence of a universally approved approach implies navigating a complex landscape of methodologies, each with its unique strengths, limitations and inherent biases. Be it the "Climate Disclosure Project (CDP)-World Wildlife Fund (WWF) Temperature Rating", S&P's "Trucost Portfolio 2°C Alignment Assessment" methodology, "The Paris Agreement Capital Transition Assessment" (PACTA), MSCI's "Implied Temperature Rise" (ITR) model or Carbon4's "Carbon Impact Analytics" (CIA) methodology, investors are faced with a diverse suite of tools to guide their journey to 'Net Zero'.

(1) AR6 Synthesis Report: Climate Change 2023 (ipcc.ch) 20 March 2023
(2) https://unfccc.int/sites/default/files/resource/sb2023_09E.pdf 8 September 2023

But how do these methodologies compare, and what are their relative merits and potential pitfalls? How do we navigate the inherent uncertainties? And, as investors, what conclusions can be drawn from the various outputs relative to the contribution of portfolios to a low-carbon future?

Understanding the array of methodologies is a necessary first step. The choice of methodology will obviously shape investors' climate strategies, thereby influencing divestment decisions, capital allocations, shareholder engagements and policy advocacy. In a world facing unprecedented climate challenges, these decisions could make the difference between a future characterised by runaway climate change and a 'Net Zero' world.



I - NAVIGATING THE THERMAL LANDSCAPE: a high-level appraisal of key methodologies

For the purposes of this comparative analysis, we have chosen to focus on those methodologies which strike us as the most widely acknowledged and utilised[3]: CDP-WWF Temperature Rating[4], S&P's Trucost Portfolio 2°C Alignment Assessment[5], Paris Agreement Capital Transition Assessment (PACTA)[6], MSCI's Implied Temperature Rise (ITR)[7] and Carbon4's Carbon Impact Analytics (CIA)[8].

	Scopes of emissions covered	Scenarios	Sector coverage	Conceptual approach	Temperature score coverage timeframe
CDP-WWF	1+2+3	Intergovernmental Panel on Climate Change (IPCC), International Energy Agency Energy (IEA) and Science-Based Targets Initiative (SBTi) "1.5°C" scenario	All sectors	Sector-specific convergence or company-agnostic contraction	2022-2026; 2027-2035; 2036-2050
S&P Trucost	1+2	IPCC and IEA	All sectors	Sector-specific convergence or company-specific contraction based on Greenhouse Emissions per unit of Value Added (GEVA)[9]	2030 (T+6)
PACTA	N/A	Scenario-agnostic[10]	"Climate-relevant" sectors[11]	Company-specific contraction/ expansion based on technology exposure	2024-2029 (T+5)
MSCI	1+2+3	IPCC and in-house scenarios	All sectors	Sector-specific convergence or company specific "fair share" contraction, which "accounts for sector, country and business activities"	2070
CARBON 4	1+2+3 where relevant (avoided emissions - "scope 4" - imbedded in their emissions savings calculations)	IPCC and IEA	All sectors	Sector-agnostic convergence	Not publicly available

(3) Please note that other methodologies not covered in this paper exist (e.g. ISS' Scenario Analysis, Arabesque's Temperature Score...)

(4) https://www.cdp.net/en/investor/temperature-ratings/cdp-wwf-temperature-ratings-methodology

(5) 1b0793a4-d1b3-48a6-a04f-58859cc68227.pdf (spglobal.com)

(6) https://pacta.rmi.org/wp-content/uploads/2022/12/PACTA-for-Investors-Methodology-Document_V1.0.pdf

(7) Implied Temperature Rise Methodology - Executive Summary (msci.com)

(8) Carbon4 Finance - CIA short version

(9) The GEVA approach equates a carbon budget to total GDP and a company's share of emissions is determined by its gross profit.

(10) Any climate scenario can be used in the PACTA analysis on condition that the scenario lays out targets in production capacity at the technology level or – for relevant sectors – emission intensity units measured in terms of production.

(11) Currently power, O&G, coal, automotive, steel, cement and aviation.

The opinions expressed by La Française AM are based on the asset manager's understanding of the above-mentioned methodologies. The asset manager declines all responsibility for any errors or inaccuracies in the information provided. The opinions expressed by la Française AM may differ from those of other investment professionals. Concerned parties should make their own assessment of the appropriate methodology.

CDP-WWF Temperature Rating

The CDP-WWF Temperature Rating framework[12] relies on companies' publicly reported Greenhouse Gas (GHG) emissions reduction targets. It evaluates and scores short, medium and long-term corporate ambitions against a range of year 2100 temperature outcomes – global temperature rise of between 1.5°C and 5°C. For the portfolio to be in line with a 1.5°C trajectory, it needs to be invested in companies for which the emissions reduction targets have sufficient coverage (referencing scopes 1, 2 & 3) and are aligned with the implied decarbonisation rate under the corresponding scenario.

- **Pros:** The "CDP-WWF Temperature Rating" methodology provides a clear and understandable metric for investors, companies and stakeholders to assess a company's alignment with Paris Agreement goals. This temperature-based rating is arguably intuitive and can help facilitate meaningful dialogue on climate action. The rating also encompasses the entirety of a company's value chain (scopes 1+2+3), hence providing a comprehensive assessment of the company's emissions profile. When a corporate, scope-3 target is deemed insufficient from a coverage or timeframe perspective, a default score is provided (currently 3.2°C).

- **Cons:** The methodology relies on self-reported data (collected by CDP); the quality, exhaustiveness and accuracy of which could be questionable.

- **Biases:** The methodology is biased towards companies with more mature and comprehensive climate disclosures, often meaning large capitalisations or investment grade companies. Additionally, given that the methodology is based on self-reported data, there might inherently be a bias towards companies more willing to engage with the CDP.

S&P's Trucost Portfolio 2°C Alignment Assessment

The "Trucost Portfolio 2°C Alignment Assessment" methodology measures portfolio alignment at the investee company-level, based on both the company's past and future performance and compared to sectoral decarbonisation pathways (SDA, available for certain sectors) or sector agnostic pathways (GEVA) when SDA pathways are unavailable.

- **Pros:** When companies do not disclose emissions reduction targets, the assessment's forward-looking data integrates (when possible) asset-level data sources which provide signals of potential future changes in production from high-emitting sources, offering much welcome granularity to investors. This methodology also incorporates historical data, which may minimise the uncertainties of using only forward-looking data and temper potential year-on-year volatility.

(12) Not discussed in this paper is the well-known Science-Based Targets Initiative (SBTi) methodology, as SBTi is a partnership between CDP, the United Nations Global Compact, World Resources Institute (WRI) and WWF: its methodology and CDP-WWF's heavily intertwine.

- **Cons:** The primary downside to this methodology is that it does not cover scope 3 emissions. In addition, while the choice of a relatively short (i.e. six years) time horizon can be justified (it offers higher intrinsic certainty and more potential errors may be avoided), it lacks the greater visibility and transparency the longer-term investment strategies may need.

- **Biases:** This methodology may show a positive bias towards companies for which scope 3 is the largest emissions scope (e.g. chemicals, construction, financial services) since scope 3 emissions are not covered.

Paris Agreement Capital Transition Assessment (PACTA)

The PACTA tool was developed by the 2 Degrees Investing Initiative (2DII) – which transferred stewardship of the framework to the Rocky Mountain Institute (RMI) in 2022. It is an in-depth, open source, asset-class-specific framework, the objective of which is to measure the alignment of financial portfolios to various climate scenarios. It relies on an assessment of the investment and production plans of companies, which are in turn based on physical asset-based company-level data: the tool consolidates this information to identify the energy transition profile of the companies and their related financial instruments[13].

- **Pros:** By providing a highly granular assessment, PACTA allows for a nuanced understanding of a portfolio's alignment with Paris Agreement targets. Its asset-specific approach adds an additional layer of precision, allowing for more targeted risk management and investment decisions.

- **Cons:** The PACTA tool's effectiveness is closely tied to the availability and quality of company-level climate data. Yet, its assessment of data quality is limited. Its focus on the most carbon-intensive sectors, while justifiable to some extent, means that a truly diversified market portfolio cannot be comprehensively assessed. In addition, it does not provide a temperature alignment score.[14]

- **Biases:** As it primarily focuses on high-carbon sectors, portfolios concentrated in these areas may receive more detailed and potentially positive assessments, creating a possible bias.

MSCI's Implied Temperature Rise (ITR)

MSCI's "Implied Temperature Rise" benchmarks company-specific GHG trajectories against climate scenario-derived warming trends.

- **Pros:** MSCI's ITR methodology computes individual temperature scores for companies even when they are considered "strongly misaligned" (>3.2°C), which may bring an additional level of granularity for investors. In addition, The calculations of companies' projected emissions include a mix of backward-looking and forward-looking indicators.

(13) Not discussed in this paper on temperature alignment, however the PACTA portfolio alignment tool now features a Transition Disruption Metric (TDM) which aims to help investors prepare for potential portfolio disruption stemming from risks associated with a disorderly transition to a low-carbon economy. For more information, please visit https://2degrees-investing.org/wp-content/uploads/2021/12/IPR-Methodology-Document.pdf

(14) The PACTA assessment output is a report which answers the following questions: What proportion of the portfolio is invested in climate-related sectors? Do the production plans of the companies in the portfolio tally with climate scenarios which comply with the Paris Agreement? Which companies in this portfolio significantly influence the results? How does my portfolio perform compared to market benchmarks?

- **Cons:** While it uses the data from the IPCC to calculate a global 2°C carbon budget, the current[15] model appears to use in-house MSCI decarbonisation pathways – which may undermine visibility and benchmarking. In addition, it is somewhat unclear which underlying assumptions MSCI relies on to compute particularly high individual corporate temperatures (well above most of the IEA and IPCC scenarios' temperature outputs on which other providers rely).

- **Biases:** Target-setting newcomers (often from highly emitting sectors) may see their ambition somewhat misrepresented in a model that systematically takes into consideration the track record of companies in achieving targets in its credibility score.

Carbon4's Carbon Impact Analytics (CIA)

Carbon4 relies on its Carbon Impact Analytics database and methodology. Every company is awarded a score which is based on its induced emissions, avoided emissions and forward-looking strategy. It aggregates scores at the portfolio-level before the temperature alignment assessment is performed.

- **Pros:** The methodology takes into account a wide range of data, including companies' historical emissions, projected emissions and mitigation strategies, as well as operational data such as process energy efficiency, production or sales locations or supply resources when possible. The fact that it computes saved emissions (avoided emissions + reduced emissions) is an additional relevant insight beyond the carbon footprint.

- **Cons:** The methodology does not provide the individual company-level temperature, which limits the extent to which investors can rely on this methodology to be active owners and engage with investee companies.

- **Biases:** Carbon4 does not appear to communicate explicitly on the time horizon for which it produces a temperature alignment output. Given the fact it uses the IPCC RCP6.0 scenario – which projects emissions until 2100 – as its "business as usual" pathway, we hypothesise that this is the time horizon Carbon4 uses for its outputs. If this is indeed the case, the approach may unfairly benefit portfolio companies from sectors which do not have sufficient technological leverage to decrease their absolute emissions in the short term (2030), such as the aviation sector[16]. Without emissions reductions in the short term, the emissions gap to limit the sector's temperature rise to 2°C or 1.5°C becomes increasingly challenging to close, and corporate climate ambitions become progressively less credible.

(15) Time of writing is November 2023
(16) https://www.iea.org/energy-system/transport/aviation

II – UNIFYING THE UNRULY: methods and challenges in portfolio temperature aggregation

A – Overarching Conceptual Approaches

Aggregating corporate-level performance is the final step in determining a portfolio temperature rise – yet, this is where the task of aligning investments with specific climate trajectories becomes further fraught with complexities.[17]

A primary concern in this realm is the challenge of sector-specific benchmarks. Each industrial sector has its distinct carbon footprints and pathways to decarbonisation. An alignment metric that is pertinent in one sector (e.g. carbon intensity per unit of energy output in the utilities sector) might be off the mark in another sector (e.g. financial services). Therefore, investors find themselves threading a delicate path to ensure that the benchmarks adopted are sector-specific and aligned with evolving climate science insights. Indeed, when mapping the different methodologies, it was discovered that several use outdated scenario datasets. Another layer of complexity arises from the variety of denominators used when articulating emissions intensities. They can manifest themselves in a myriad of forms, from emissions per dollar of revenue to those per unit of product (which varies from one sector to another). Any attempt at aligning or averaging numbers extracted from different units of measurement can inadvertently distort results, leading to potential misinterpretations. The complexity does not end here: the specter of double counting, especially when considering scope 3 emissions, looms large. These emissions often see multiple claims across a supply chain. A classic scenario is where emissions from a component's production are attributed both to the component's manufacturer and the final product's assembler. This overlap, unless meticulously adjusted, can pollute temperature scores.

Turning our attention to the overarching methodologies adopted for portfolio temperature aggregation, two predominant conceptual approaches emerge – the weighted average of company-level temperature scores and the aggregated over/under-shoot of company-level absolute emissions (relative to the allocated carbon budget) translated into a temperature score[18]. The weighted average of company-level temperature scores weights individual scores based on a pertinent metric, such as market value or emissions, culminating in an average. There are two options within this approach: the portfolio weight method and the portfolio-owned emissions method[19].

With the former, corporate temperature scores are weighted in relation to their share in the investor's portfolio and with the latter, the emphasis shifts to weighing corporate scores according to their contribution to the total emissions of investee firms. Not only is the portfolio weight method intuitive and straightforward (as it follows the investment logic), but it may also be more apt to gauge risk exposure as it is not correlated to a portfolio percentage of ownership of an asset, but rather to the relative amount of a portfolio invested in this asset.

On the other hand, the portfolio-owned emissions method provides a clearer picture of a company's relative share in total portfolio emissions as it is an extension of the GHG Protocol logic, which attributes supply chain emissions to a company on a per share basis and is part of a financial institution's scope 3 « financed emissions ».

(17) Though they are not discussed in this paper, it should be noted that some methodologies aiming to assess decarbonisation strategies and progress only focus on corporate-level assessments, leaving aggregation open to investors and lenders altogether (e.g. Transition Pathway Initiative).

(18) TCFD https://www.tcfdhub.org/wp-content/uploads/2021/10/PAT_Measuring_Portfolio_Alignment_Technical_Considerations.pdf

(19) CDP recognises several weighting calculations – some based on portfolio weight, some on portfolio-owned emissions – each of which is explained alongside circumstances under which it may be more relevant than another in its methodology document (linked on p.2 of this paper). The other methodologies described all take a portfolio-owned emissions approach.

The second conceptual approach, more intricate in its design, aggregates the extent to which emissions from portfolios deviate from their assigned carbon budget. The difference is subsequently converted into a temperature score. This can be done directly in cases where the benchmark is expressed in absolute emissions units. Alternatively, deviations in emissions intensity at the company level can be converted into absolute figures by multiplying emissions by the relevant denominator. The advantage of this method is its thoroughness (i.e. providing a perspective that ties portfolio outcomes directly to carbon budgets) coupled with the potential for improved accuracy. Since the overshoot is calculated at the company level, a portfolio weight approach is only possible to the extent that the investor is able to compute a company-specific temperature, whereas a portfolio-owned emissions approach requires summing up sectoral emissions overshoot in the portfolio vs the relevant pathway.

A key step in setting the emissions baseline lies in deciding how companies' emissions and activity data are allocated to an investor or lender. If all investors and lenders were assigned 100% of corporate-level emissions, there would be considerable double-counting across financial sector actors, and investors would be held accountable for more than their share of investment. Typically, this allocation reflects the proportion of a company owned by an investor and could be measured using the enterprise value, the value of equity, the sum of enterprise value and cash or total assets[20]. As such, the limit of an approach based on emissions ownership is that it may introduce volatility when assigning emissions to an investor or lender according to their ownership share. Indeed, these emissions may be impacted by adjustments to the denominator – meaning even when actual corporate emissions may not have fluctuated at all. In our opinion, further research is needed on adjustment factors.

B – La Française AM's Approach and Rationale

La Française AM uses CDP-WWF temperature datasets – and has done so for several years. Not only do these temperature ratings encompass all scopes of emissions, but thanks to CDP's questionnaires, the investment manager has instant and thorough visibility over the initiatives, technologies and investments that investee companies plan to leverage. Unlike several of the aforementioned methodologies, the CDP-WWF approach allows us to have investee company-level temperature alignment scores, thereby fostering our ability to engage with investee companies in a granular manner. In cases where a temperature rating is unavailable, a conservative approach is taken by applying a default score of 3.2°C. This figure corresponds to the default temperature assigned by CDP to a company that does not communicate its level of ambition in terms of emissions and the temperature increase the IPCC projects by 2100 in the absence of a strengthening of policies[21]. The temperature scores are aggregated at the portfolio level using the Weighted Average Temperature Score (WATS) method, where temperature scores are allocated based on portfolio weights.

As such, La Française AM favours a bottom-up approach, which allows a forward-looking assessment of investee company performance. The asset manager has developed and subsequently updated its in-house Low Carbon Trajectory (LCT) analysis model, which coincided with the launch of its climate change mitigation investment strategy in 2015. Including a granular look into capital expenditure plans, the proprietary model provides visibility on the most likely future climate performance of companies in high-emitting sectors and, as such, the

(20) CDP and WWF International performed a detailed review of weighting options in a 2020 consultation paper, the results of which were presented here https://sciencebasedtargets.org/resources/legacy/2020/04/Temperature-Scoring-Methodology-Public-Consultation-Draft.pdf. These accepted calculations (including WATS) are available in CDP's final methodology document, linked on p.2 of this paper.

(21) https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_FullVolume.pdf p.11

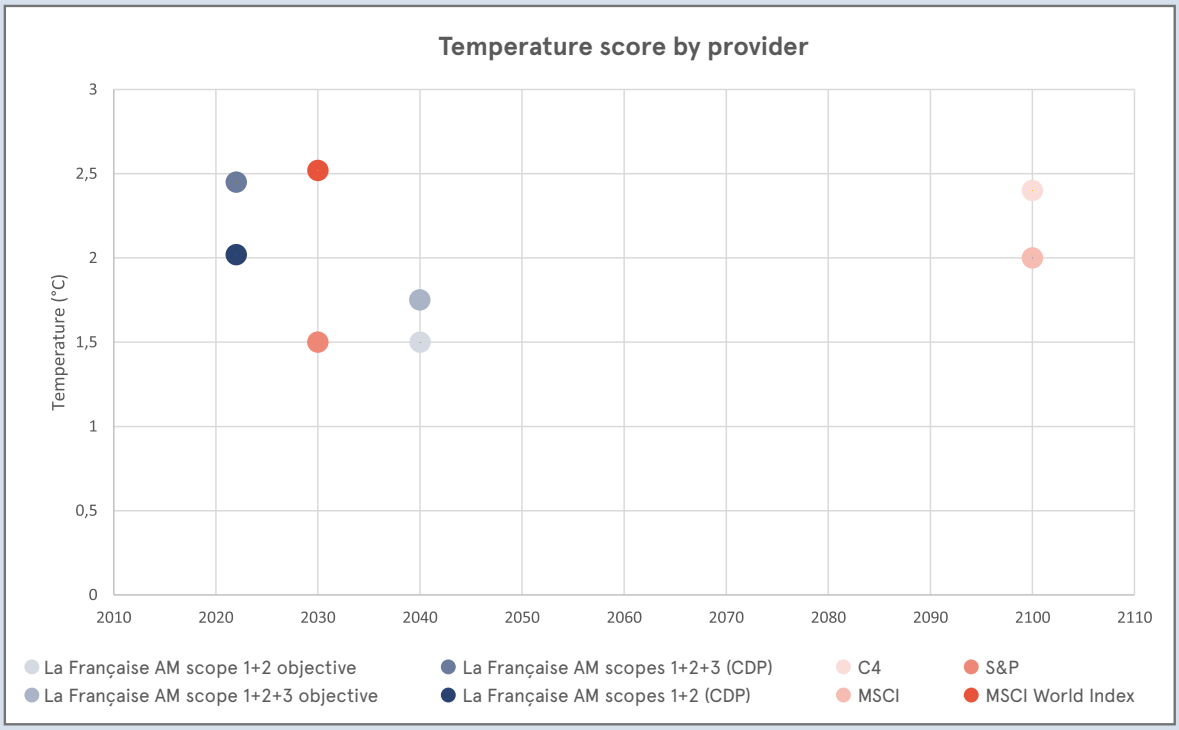
possibility to override CDP temperature scores when relevant. The in-house methodology is guided by the work of the IEA's Energy Technology Perspectives (ETP) and World Energy Outlook (WEO). Unlike several methodologies, we do not use the Sustainable Development Scenario (SDS), considering the IEA stopped updating it after 2021[22]. Sectoral pathways are modeled for each scenario up to 2030 by identifying the types of economic activities covered by the IEA and building a sectoral ratio based on our findings. Once a sectoral pathway has been set up, a temperature confidence corridor for each company under analysis is modeled. As opposed to some of the aforementioned approaches, we do not allocate a company its share of emissions relative to its sector's carbon budget based on market share, as the robustness of this concept with regard to scope 3 emissions may be a concern. Currently, La Française AM's LCT model covers eight industries: aluminum, airlines, electric utilities, car manufacturers, cement, oil and gas, paper and steel. Additionally, a qualitative, TCFD-based assessment is performed on companies across all sectors.

Thanks to La Française AM's work on emissions and temperature gauging across its portfolios over the last eight years, the asset manager signed the Net Zero Assessment Managers Initiative (NZAMi) in 2021. This commitment both reaffirms the asset manager's climate strategy as an investor and further facilitates impactful engagement with investee companies to accompany them in their climate journey.

(22) The last World Energy Outlook that included updated computations for the SDS: https://www.iea.org/reports/world-energy-outlook-2021

III – PORTFOLIO HEAT CHECK: a case study

La Française AM ran one of its global equity portfolios through the models of various providers in order to gauge the level of output disparity. See results below.



S&P computes the lowest portfolio temperature alignment score, with a 2030 alignment to a <1.5°C. This is explained – at least in part – by the fact that it only covers emissions scopes 1+2. Given the inclusion of power companies for example within the portfolio, it can be concluded that significant emissions are unaccounted for with this methodology. For reference, La Française AM's scope 1+2 current temperature output for this portfolio is 2.02°C. MSCI computes a 2050 temperature alignment score of 2°C and Carbon4 a 2100 alignment score of 2.4°C. The latter comes closest to the current temperature alignment that La Française AM computed for the portfolio – the highest output of the sample[23] – using the CDP methodology and our proprietary LCT model, namely 2.45°C.

Putting aside the S&P output (which should be taken with a grain of salt considering its emissions coverage), an interesting point is that the methodologies examined all compute outputs which illustrate that this portfolio, in its current composition, is not aligned with a Net Zero Scenario or even a Paris-aligned trajectory (≤2°C). While this consensus is arguably meaningful in its own right, the crucial takeaway is actually that the more conservative a temperature alignment approach, the more ambitious an NZAMi signatory needs to be in order to achieve its public commitment to meet Net Zero. It is a more challenging endeavour to choose a stringent methodology and to face the implications – e.g. the portfolio presented here will need to decarbonise at a faster pace – than to settle for a methodology for which the assumptions offer more leeway and an opportunity to showcase a lower temperature without needing to undertake efforts to decarbonise the portfolio further.

(23) The methodology used to calculate a temperature alignment score for the portfolio is the one we submitted to the NZAMi in spring 2023 light of our commitment renewal.

In addition, it is perhaps worth extrapolating the data at the macro level to remind oneself that the real world, real economy consequences of a 2°C versus 2.45°C degree temperature increase would likely greatly differ in magnitude and frequency. Indeed, according to the IPCC, a plethora of wide-ranging, adverse implications are already considered likely in the case of a 2°C versus 1.5°C global temperature increase[24], and they are expected to snowball beyond this potential level of warming: "evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (medium confidence)" ("extremes" refers to "increases in mean temperature in most land and ocean regions, hot extremes in most inhabited regions, heavy precipitation in several regions and the probability of drought and precipitation deficits in some regions")[25].

This underlines the need for due diligence even at the micro level. In our opinion and given the responsibility finance plays in the climate transition, it is key that investors seek a temperature alignment methodology that favours conservative hypotheses when assumptions with a relatively high degree of underlying uncertainty need to be taken as opposed to a methodology that fits the portfolio alignment output they hope for (e.g. 1.5°C or 2°C aligned). Consequently, investors have more realistic visibility over the likely climate risks and opportunities its portfolios will face.

(24) "Climate models project robust differences in regional climate characteristics between (...) 1.5°C and 2°C" Summary for Policymakers — Global Warming of 1.5 ºC (ipcc.ch)

(25) Ibid

IV – FROM DEGREES TO DOLLARS: portfolio composition, temperature and financial implications

Beyond aggregation concerns, it is crucial to keep in mind that "defining features" of investee companies also play a pivotal role in temperature scores and more particularly, on the level of certainty that can be attributed to them. Established entities, particularly investment grade companies or large capitalisation companies tend to have more sophisticated reporting and sustainability frameworks due to stringent regulatory requirements, stakeholder expectations and their larger footprint. This means more consistent data, leading to increased reliability when their climate performance is gauged. An investment-grade company or large capitalisation company with a low temperature score is usually perceived to have a proactive risk management strategy, potentially leading to tighter credit spreads and/or a lower equity risk premium. In contrast, high yield or smaller firms may lack resources or incentives to consistently disclose or mitigate environmental impacts, translating into potentially higher temperatures and limited confidence. Like a vicious circle, the inherent volatility and risk associated with these firms may actually be exacerbated by uncertain temperature assessments: from a financial perspective, limited disclosure may affect these entities' cost of capital.

As such, a portfolio's composition significantly affects its temperature profile. An investment grade or large capitalisation portfolio is likely to exhibit lower temperatures given that these entities' exercise more evolved ESG practices and transparent disclosures. These lower temperatures may be understood to imply a lower default risk and a relative protection against credit spread widening. From an asset valuation standpoint, these portfolios might command a premium given the lower "climate risk" discount rates applied during valuation. Conversely, high-yield bond or small cap portfolios, containing a higher proportion of smaller firms, might reflect higher temperatures. A crucial particularity of the temperature-setting exercise must however be highlighted here: temperature difference is not solely an illustration of different levels of ambition but is also indicative of the quality and availability of data. For example, such portfolios might exhibit a higher temperature, not because of inferior climate alignment but because of less consistent and comprehensive disclosures.

Regardless of the size of the company, overall high temperatures – when linked to lagging climate performance – may not just signal environmental risks but also overvaluations[26] and potential credit risks[27]. This dual threat may lead to heightened yield expectations and an increase in the discount rates applied. This consideration further emphasises the necessity of nuance and contextualisation in the endeavour of temperature setting.

Temperature scores, seen through the prism of financial metrics, offer more than just environmental insight. These aforementioned subtleties carry profound implications for investors: they intertwine with credit ratings, default probabilities and expected returns. A shift in temperature score can lead to a recalibration of the capital asset pricing model inputs, potentially affecting asset valuations. Furthermore, these scores play directly into modern portfolio theory: investors might leverage them to optimise the risk-return trade-off, especially when incorporating environmental risks. For instance, adding a security with a favorable temperature score might reduce the portfolio's overall beta, aligning it with the broader climate goals without compromising on expected returns.

(26) Bansal et al. (2016) National Bureau of Economic Research Price of Long-Run Temperature Shifts in Capital Markets (nber.org)
(27) European Central Bank The low-carbon transition, climate commitments and firm credit risk (europa.eu)

Temperature assessments should therefore not be taken at face value: a portfolio's temperature reflects the actual environmental efforts of investee companies and the granularity and accuracy of available data. It is also relevant to emphasise that temperature outputs can present opportunities and challenges. For instance, while a small cap portfolio may have a higher temperature, it might also offer greater potential for impactful engagement. In this sense, an investor exposed to a wide and diverse set of asset classes will typically find that it requires more manual input to get an exhaustive overview of corporate commitments and climate levers.

Acknowledging these nuances ensures that investors set realistic climate goals, define effective strategies and engage meaningfully with their holdings. Such informed decision making is pivotal in laying the foundation for a climate-resilient financial future.

SYNTHESISING AND REFLECTING ON CLIMATE AND FINANCE

As we stand at the confluence of climate and finance, it behooves us as investors to critically evaluate the tools developed to measure the alignment of portfolios with a more sustainable future. The intricate undertaking of portfolio temperature target setting, while rooted in empirical analysis, bears profound implications for both our planet and the financial landscape.

The inherent biases within existing methodologies further underline the challenges of translating complex environmental phenomena into actionable financial strategies. They remind us that while science provides the compass, the finance sector wields significant influence in charting the course. These biases occasionally distinguish between investments that are truly green and those that merely wear a veneer of sustainability. From a fiduciary standpoint, certain methodologies could lead to mispriced assets[28][29], or worse, to systemic risks that could reverberate across portfolios[30]. The nuanced differences among the methodologies provide insight into the ever-evolving dynamics of climate finance. They underscore the reality that there is no "one size fits all" approach: different sectors, regions and asset classes demand bespoke strategies, each with unique risk-return profiles. For instance, the complexities of integrating climate considerations into asset valuation become apparent when adjusting discount rates or cash flow expectations based on temperature targets . These nuances influence not only yield expectations but also shape considerations around portfolio diversification and optimisation in the face of looming climate risks.

Delving into the underlying hypotheses of these methodologies implies confronting the challenges of forward-looking projections in a world filled with uncertainties. These hypotheses are not merely extrapolative but weave complex narratives about technological advancements and policy shifts as well as social and behavioral change. Their financial implications range from potential capital reallocations favouring green technologies to understanding the cost of capital in a decarbonised world.

As the climate narrative continues to evolve at a rapid pace, so too must our strategies for understanding and managing its risks and opportunities. As such, rigorously evaluating and understanding the methodologies that underpin these strategies is a task that can no longer be neglected. In this spirit of urgency, we anticipate at least one paramount potential development in Net Zero by 2050 target setting, motivated by the need for improved climate data and reporting. As discussed throughout this paper, the limitations of the existing methodologies often stem from gaps in the available data, particularly from underlying investee companies. In the wake of the European Green Deal, investors have started to witness a greater push towards mandatory and standardised climate reporting: the Corporate Sustainability Reporting Directive (CSRD), published at the end of 2022 and mandatory for many entities as of January

(28) Stranded assets for example can occur either in the event that carbon intensive assets are no longer able to earn an economic return due to changes associated with a low carbon transition (e.g. policy action, technology), or simply because the asset value is less than expected as a result of changes associated with an energy transition or in the event that it is costly or impossible to shift around the underlying capital stocks in the carbon-intensive industries to productive use elsewhere. This may lead these assets to undergo unanticipated or premature write-downs, devaluations, conversion and/or liabilities.

(29) For an overview of the literature on the wider topic of pricing climate risks in financial markets, please see the Bank for International Settlements paper (2022). For specific insights in corporate governance and market (in)efficiency mechanisms which showcase the prevalence of mispricing at the individual asset level, please see M. Condon (2021), Boston University School of Law.

(30) S. Keen (2023), University College London

2024, revised and strengthened the rules introduced by the existing Non-Financial Reporting Directive (NFRD). It aims to ensure that companies publish reliable and comparable sustainability information so as to improve transparency for all stakeholders and redirect investments towards more sustainable technologies and companies. The directive has given way to an unprecedented increase in the number of companies subject to European sustainability reporting requirements, which, in the context of temperature assessments, may well increase the accuracy of outputs. Indeed, simply because a corporate climate endeavour or commitment is not disclosed does not necessarily mean that it does not exist or that the company is not implementing a roadmap to achieve it.

Each climate commitment, and choice of methodology for translating it into a temperature score, inevitably echoes through our ecosystems, determining which natural habitats are preserved, which carbon sinks remain viable and how swiftly we can put a halt to ongoing biodiversity loss. Our fiduciary responsibilities are inextricably intertwined with our stewardship of the planet.

Portfolio temperature setting is emblematic of the broader challenges and opportunities at the nexus of climate change and global finance. With rising global consciousness and increasing regulatory pressures, the landscape of portfolio temperature setting is poised for continued progress. It is imperative for financial institutions to stay abreast of these developments and adapt their strategies accordingly, ensuring that they play their part in the collective journey towards a net-zero world. During this elaborate journey, it is through the acknowledgment of biases, a deep understanding of nuances and rigorous hypothesis testing that we accelerate sustainable finance and ultimately protect our planet.

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