The Climate Data Conundrum

What are 'Scope 4' emissions and why do they matter for portfolio construction?

Investor Commentary, Storebrand Global ESG Plus Fund

Mandatory reporting requirements aligned with the Taskforce for Climate Related Financial Disclosures (TCFD) are gradually being phased-in around the globe[1], improving both company data and investors' awareness of climate risk exposures. Yet, current data is far from perfect, with disclosure levels and accuracy remaining patchy. Over 40% of FTSE All World Index constituents are still not disclosing their Scope 1 and 2 emissions but Scope 3 disclosure levels are "significantly poorer" and estimated data is notoriously spurious[2].

This matters because an incomplete or inaccurate picture of climate data, at either an individual security or total portfolio level, can lead to unintended consequences in portfolio construction and a misunderstanding of climate risk exposures. For example, portfolios that seek to minimise climate risk using Scope 1 and 2 data alone can lead to perversely large Scope 3 risk positions. Also, a systematic requirement to reduce carbon emissions year on year, such as that imposed in an EU Paris Aligned Benchmark (PAB), could lead to missed opportunities in climate-positive technologies on account of their production phase (Scope 1 and 2) emissions.

Regulation is evolving in an attempt to resolve the Scope 3 challenge. The EU Commission requires Scope 3 data to be phased-in to EU PAB construction by sector - with energy, mining, transportation, construction, buildings, materials and industrials all included as of December 2022, and all other sectors by December 2024[3]. New TCFD reporting consultations for public sector pensions in the UK emphasise the importance of collecting lifecycle data, as well as data quality metrics[4]. The US Security and Exchange Commission (SEC) has drafted a directive which would require unified corporate emissions disclosures, including Scope 3[5].

In a recent paper, titled Climate Benchmarks: The Passive Pretenders[6], we outlined the risks associated with 'passively' using climate datasets in portfolio construction and made the case for specialist risk oversight in systematically managed climate aware equity portfolios. It is worth considering whether these issues will be resolved by the inclusion of increasingly accurate Scope 3 data in 'passive' climate portfolio construction.

An important feature of the Storebrand Plus Fund range[7] is its ability to evolve over time to account for ever improving climate science, policy and data. Since inception of the fund range in 2016, we have used Scope 1 and 2 emissions data to optimise the

[1] https://www.edie.net/tcfd-mandate-everything-you-need-to-know-about-the-uks-new-climate-disclosure-requirements/
[2] https://content.ftserussell.com/sites/default/files/mind_the_gaps_-_clarifying_corporate_carbon_final_0.pdf
[3] https://www.handbook.fca.org.uk/techstandards/BMR/2020/reg_del_2020_1818_oj/chapter-ii/section-1/006.html
[4] https://www.storebrand.no/en/asset-management/sustainable-investments/document-library/_/attachment/inline/be54d-9ca-dd12-498b-8c41-071b583c4b0b:122efb524e9caecce4c9bd596c265e5ab71cd608/SAM%20Opinion%20Piece%20on%20Climate%20Reporting%20Legislation%202023.pdf
[5] https://www.edie.net/climate-risk-disclosures-mandate-drawn-up-in-the-us/
[6] https://www.storebrand.no/en/asset-management/sustainable-investments/document-library/_/attachment/inline/9d048c64-51ef-474e-a7d7-3f70bce-50cd5:eee5617f1d0f0e477fd670981fc21ecfa481c6a9/Climate%20Change%20Benchmarks%20The%20Passive%20Pretenders.pdf
[7] A range of systematically managed, index based global and regional equity portfolios designed to minimise benchmark relative risks and align with the long-term goals of the Paris agreement.

portfolios towards companies with lower transition risk - but have crucially sought to manually adjust any erroneous risk positions resulting from missing Scope 3 data, and to reduce Scope 3 exposure risks based on specialist climate research. We monitor Scope 3 datasets with a view to integrating lifecycle emissions data in our systematic portfolio construction process. However, current third-party datasets remain too reliant on estimations and, as corroborated by recent academic research, their quality and accuracy varies considerably[8]. Our own research demonstrates that current Scope 3 datasets are not of a quality suitable for systematic portfolio construction, requiring ongoing monitoring and risk oversight. However, our research into carbon data quality has also highlighted a challenge that will persist even if perfect Scope 3 data becomes available.

What is 'Scope 4'?

Put simply, Scope 4 emissions are 'avoided emissions' from using an alternative, more climate-friendly, product or technology. Examples of products and services that might claim 'avoided emissions' are video-conferencing technology, public transport providers and companies that create more energy-efficient products and appliances compared to their competitors.

The World Resources Institute, responsible for the GHG Protocol, defines Scope 4 as emissions reductions that "*occur outside a product's life cycle or value chain but as a result of the use of that product,*"[9]. But Scope 4 is not an official category of the GHG Protocol and a lack of methodological standardisation makes company reported Scope 4 data less verifiable and comparable than other emissions reporting[10]. The risk of corporate greenwashing has led CDP and the Science Based Targets initiative (SBTi) to separate or exclude Scope 4 from company reporting standards and target setting[12]. Avoided emissions should not be used to offset against Scope 1, 2 and 3 emissions under these standards and do not count towards verified net-zero target setting . Largely this is due to the difficulty in clearly defining Scope 4 for the full range of climate solutions and all potential future climate outcomes. For example, what should be the baseline against which avoided emissions are calculated? Should an insulation product designed for energy efficiency in buildings be judged against the emissions from having zero insulation, or against competitor insulation products[13]? Further, big emitters have been accused of making dubious claims to externally sourced 'offsets' involving 'avoided emissions' in order to fulfil their 'net zero' assertions, while continuing to grow their own emissions output. This is where verifications of additionality, equivalence and permanence become crucial. For example, would the purchased 'offsetting' programme have taken place without the investment in question? Is the offset genuinely leading to avoided emissions equivalent to the organisation's emissions growth output, or just contributing to a potential scenario in which emissions are avoided, such as forest management programmes that reduce the risk of wildfire?

At an individual company level, Scope 4 emissions reporting and accounting is therefore problematic. However, viewing the economic transition, and potential alignment of a global equity portfolio, through a top-down lens while only using Scopes 1, 2 and 3 data leads to problems of its own.

Why does Scope 4 matter? The heat pumps example.

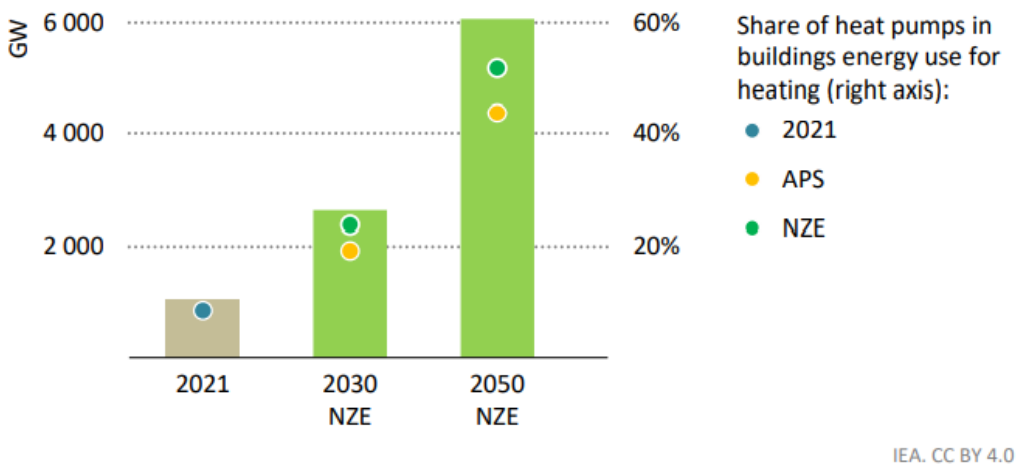
We continue to see an unbalanced investor and regulatory focus on reducing reported emissions in the current system compared with envisioning the post transition economy. There is relatively too little focus on the solutions to the climate crisis in Paris aligned benchmarks and climate transition benchmarks (PABs and CTBs), where year on year Scope 1, 2 and ultimately Scope 3 emissions reduction is paramount.

It is critical that companies address their own Scope 1, 2 and 3 emissions before considering any offsetting calculations but a failure to consider Scope 4 emissions at a top level can prevent investments in climate positive solutions. This leads to a missed opportunity for investors that want to align with the transition to a low carbon or net zero economy.

The International Energy Agency (IEA) recently published a report lauding heat pumps as *"the central technology in the global transition to secure and sustainable heating"*[14]. The IEA predicts huge global growth to address both the climate crisis and energy security challenge, stating *"Government energy security concerns and climate commitments would make heat pumps become the primary means of decarbonising space and water heating."*

[8] Scope 3 Emissions: Data Quality and Machine Learning Prediction Accuracy Nguyen et al. (2022)
[9] https://enterprise.ft.com/en-gb/blog/measuring-scope-4-emissions-what-boards-need-to-know/
[10] https://esgclarity.com/measuring-scope-4-emissions/
[11] https://enterprise.ft.com/en-gb/blog/measuring-scope-4-emissions-what-boards-need-to-know/
[12] https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf and https://sciencebasedtargets.org/resources/files/SBTi-Corporate-Manual.pdf
[13] https://www.institutlouisbachelier.org/wp-content/uploads/2021/03/the-alignment-cookbook-a-technical-review-of-methodologies-assessing-a-portfolios-alignment-with-low-carbon-trajectories-or-temperature-goal.pdf
[14] https://iea.blob.core.windows.net/assets/2cf6c5c5-54d5-4a17-bfbe-8924123eebcd/TheFutureofHeatPumps.pdf

Figure 1 – IEA – Global heat pump capacity and coverage of heating needs in the APS and NZE Scenario, 2021-2050
Source: IEA WEO Special Report, Figure 1.12, page 32[15]



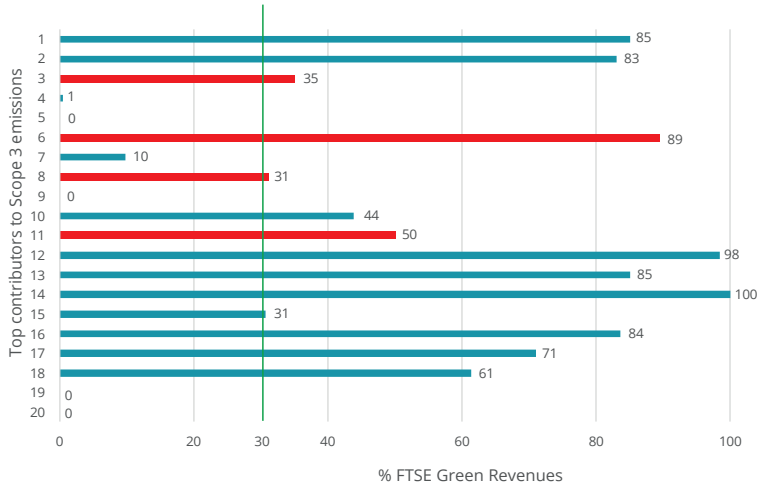
It would therefore be reasonable to expect a portfolio that aims to align with the transition to a low carbon economy to provide exposure to heat pumps as a source of opportunity. We include companies that produce heat pumps in the dedicated climate solutions allocation in the Storebrand Global ESG Plus portfolio. However, in our monitoring of Scope 3 data, we identify them as a major source of Scope 3 emissions in our portfolio.

Figure 2 shows the percentage of company green revenues generated by the top twenty contributors to Scope 3 emissions intensity for the Storebrand Global ESG Plus Fund.

These 20 companies make up two thirds of the Fund's entire Scope 3 intensity. The average green revenues percentage generated by these companies is almost 50%, and fourteen of these top Scope 3 contributors generate over 30% of their revenues from climate solutions activity as highlighted in the chart. In contrast, MSCI World's Scope 3 emissions intensity is more skewed towards fossil-fuels related companies. Only three of the top 20 contributors to MSCI World's Scope 3 carbon intensity have green revenues accounting for over 30% of total revenues.

Four of the Fund's biggest contributors to Scope 3 emissions provide portfolio exposure to heat pumps (illustrated as red bars in Figure 2).

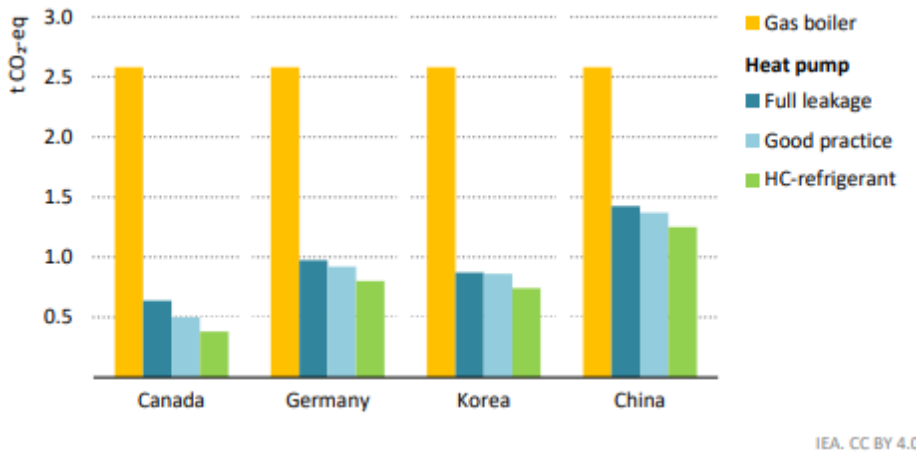
Figure 2 – Top twenty contributors to portfolio Scope 3 emissions intensity and company % green revenues
Source: Storebrand, Portfolio Manager analysis of Storebrand Global ESG Plus, based on contribution to portfolio emissions (Trucost) and FTSE green revenues as at 31 December 2022.



If we were to optimise the portfolio using Scope 3 data, or reduce Scope 3 portfolio emissions to meet an annual reduction target, this could lead us to reduce our position in this key transition technology.

A key reason that heat pumps have high Scope 3 emissions is the electricity powering the technology, although this will vary substantially by location as illustrated in Figure 3. However, the IEA highlights that, compared to gas boilers, heat pumps offer significant emissions reductions *"in all major heating markets, even with the current electricity generation mix— an advantage that will increase further as electricity systems decarbonise".*

Figure 3 – IEA – Lifetime GHG emissions per unit of annual useful heat output for gas boiler and heat pump, by refrigerant option



Source: IEA WEO Special Report, Figure 2.7, page 58[16]

Another reason that heat pumps have high Scope 3 emissions is their use of potent greenhouse gases, called Fluorinated gases or 'F-gases', as refrigerants. F-gases are used in many industrial and household appliances, such as air conditioners and refrigerators, and they are currently a component of heat pump technology. The use of hydrofluorocarbons (HFCs) / F-gases escalated with the phase-out of ozone destructive chlorofluorocarbons (CFCs). HFCs are not damaging to the ozone layer but they have an extremely potent greenhouse gas effect[17]. Effective management of refrigerants and the use of alternative refrigerants are therefore key solutions to the climate crisis, both listed in the top ten most impactful climate solutions by Project Drawdown, as shown in Figure 4.

[15] https://iea.blob.core.windows.net/assets/2cf6c5c5-54d5-4a17-bfbe-8924123eebcd/TheFutureofHeatPumps.pdf
[16] https://iea.blob.core.windows.net/assets/01324438-d634-4d49-95d8-3d08aaab00d5/TheFutureofHeatPumps.pdf
[17] https://drawdown.org/solutions/refrigerant-management

Figure 4 – Project Drawdown table of solutions

** Gigatons CO2 Equivalent Reduced / Sequestered (2020–2050)*

SOLUTION	SECTOR(S)	SCENARIO 1 *	SCENARIO 2 *
Onshore Wind Turbines	Electricity	46.95	143.56
Utility-Scale Solar Photovoltaics	Electricity	40.83	111.59
Plant-Rich Diets	Food, Agriculture, and Land Use / Land Sinks	78.33	103.11
Reduced Food Waste	Food, Agriculture, and Land Use / Land Sinks	88.50	102.20
Tropical Forest Restoration	Land Sinks	54.45	85.14
Clean Cooking	Buildings	31.38	76.34
Family Planning and Education	Health and Education	68.90	68.90
Distributed Solar Photovoltaics	Electricity	26.65	64.86
Refrigerant Management	Industry / Buildings	57.15	57.15
Alternative Refrigerants	Industry / Buildings	42.73	48.75

Source: Project Drawdown, table of solutions[18]. The results have been sorted by 'Drawdown Scenario 2, roughly in line with 1.5C temperature rise at century's end', as at 4th January 2023.

It is therefore imperative that harmful refrigerants are carefully managed and phased out with climate friendly replacements. However, heat pumps are also a top solution to the climate crisis, according to both Project Drawdown and the IEA[19]. The IEA's recent research paper accounts for the use of F-gases in heat pump technology, concluding that good practice (maintenance, recycling, use of alternative, non-HFC, refrigerants) can substantially reduce the emissions from leakage but importantly that *"With today's refrigerants, heat pumps still reduce greenhouse gas emissions by at least 20% compared with a gas boiler, even when running on emissions-intensive electricity. This reduction can be as large as 80% in countries with cleaner electricity."* This is illustrated in Figure 3 above, which shows the substantial reduction in emissions from heat pumps compared to gas boilers for a range of refrigerant management options.

The distinction between categories of Scope 3 emissions is important. Some Scope 3 emissions, such as electricity generation, may be out of the control of the company in question but will be expected to reduce over time as the grid decarbonises. Other Scope 3 emissions, such as F-gases, are a potential area for engagement with companies and policymakers to ensure good practice, avoiding leakages and managing end of life disposal, and ultimate phase out.

The IEA report highlights that F-gas management and replacement is essential but that *"Policy makers need to ensure that measures to accelerate the phase-out of HFCs do not hold back strengthened heat pump uptake, whose climate benefits far outweigh the negative climate effects of HFC leaks."*

Our analysis shows the same sentiment applies to portfolio construction – high Scope 3 emissions should not prevent investments in heat pumps, whose climate benefits from avoided emissions far outweigh their Scope 3 emissions. To contextualise this, we can use a company example. One of the companies in our climate solutions portfolio is Daikin, a company which produces energy-efficient heat pumps as a solution to climate change. Daikin cites the UK government's net-zero targets, phase-out of gas heating for new houses by 2025 and requirement for a mass transition to low-carbon heating by 2030 on their website[20]. Daikin also sits in one of the sectors for which the EU already requires Scope 3 data to be incorporated into PAB and CTB portfolio construction, where 7% emissions reductions are required across the benchmark every year.

[18] https://drawdown.org/solutions/table-of-solutions
[19] Drawdown top 50 solution, IEA 'core technology'.
[20] https://www.daikin.co.uk/en_gb/energy-for-change/residential.html?gclid=CjwKCAiAqt-dBhBcEiwATw-ggNRxM-LzDZqsfas-liXU4Ei5IaRIEmeGfvvhkJhZE-bac2bCMfIIZABoCITEQAvD_BwE

Daikin is a large source of Scope 3 emissions in our portfolio, illustrated as company number 6 in Figure 2 above, but justifies its position as a climate solution company with a technology that is expected to experience rapid global growth in line with the transition to a Paris-aligned economy. It would not make sense for us to reduce its position due to high Scope 3 emissions, as demonstrated by the IEA research. A discerning view of emissions data, and oversight by a climate specialist portfolio manager allows us to spot these unintended consequences that might occur in 'passively' managed solutions such as climate indices.

The largest single company contribution to Scope 3 emissions intensity in our portfolio comes from a company which produces energy efficient 'inverters' which are needed in Electric Vehicles to act as a converter between the alternating current used in the grid and the engine, and the direct current used in the EV battery. FTSE defines 85% of their revenues as 'green' but their large Scope 3 intensity occurs due to indirect emissions in the use phase which will be expected to reduce over time as the electricity grid is decarbonised. Other large Scope 3 contributions come from LED lighting producers, whose product uses up to 90% less energy than the conventional halogen products they replace – another example where consideration of avoided emissions is valuable in portfolio construction.

The purpose of our climate solutions portfolio is to add an opportunity dimension to our Paris-alignment aim. We target a 'climate beta', meaning our portfolio should outperform (or underperform) on positive climate developments (or negative developments) vs market expectations. In our view, current broad-market equity 'Paris alignment' products, such as PAB indices, do not provide meaningful exposure to a sufficiently diverse range of climate solutions technologies and products. Paris-alignment is not only about emissions reduction but incorporates a whole economy transition and the rapid growth of many nascent industries. This means the largest companies in the world, as represented by the market cap world indices, will look quite different in a Paris-aligned, net zero, future.

Given the challenges associated with defining and reporting Scope 4 emissions, as detailed above, we do not think this is easily resolved with datasets that can be incorporated into systematic portfolio construction. Rather, the complexity of corporate carbon emissions reporting and attribution warrants careful application of data in portfolio construction. Expert oversight is essential such that Scope 4 emissions, alongside Scope 3, can be used as a guiding concept in risk management.

Metrics, Targets and Outcomes

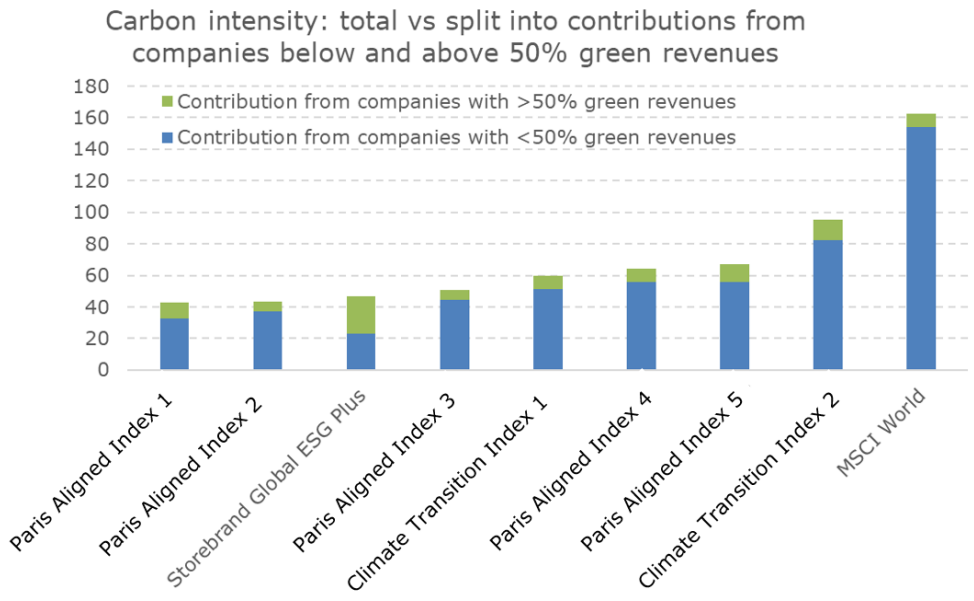
We do not penalise climate solutions companies for Scope 1, 2 or 3 data in the optimisation process in order to avoid under-weighting climate positive companies based on an incomplete picture of outcomes. Although we aim to minimise portfolio carbon emissions to limit climate risk, we do not want to unreasonably limit climate opportunities. New TCFD reporting requirements for pension schemes place an emphasis on reporting portfolio emissions data on an annual basis alongside targets and progress. In our recent response[21)] to the UK government consultation on the governance and reporting of climate change risks in the UK Local Government Pension Scheme (LGPS), we stressed the importance of considering the sources of portfolio emissions in relation to company size, sector and geography. For example, in delivering products that generate green revenues, companies will generate carbon emissions. A climate solutions company, such as a solar panel producer, may subsequently be underweighted in optimisation based on its carbon intensity data relative to a combustion engine car maker. For this reason, we believe a breakdown of Scope 1 and 2 emissions associated with companies generating green revenues vs other companies is a useful climate risk metric (see Figure 5). We do not think it is sensible to systematically reduce positions in climate solutions companies due to their Scope 1 and 2 production emissions.

If data is only available with the appropriate level of coverage and accuracy at a Scope 1 and Scope 2 level, investors might consider the proportion of those emissions that are related to climate solutions activity and discount that from any emissions reductions targets. This would be a way of avoiding unintended reductions in climate solutions activity due to production phase emissions, in absence of accurate full lifecycle data.

21) https://www.storebrand.no/en/asset-management/sustainable-investments/document-library/_/attachment/inline/be54d-9ca-dd12-498b-8c41-071b583c4b0b:122efb524e9caecce4c9bd596c265e5ab71cd608/SAM%20Opinion%20Piece%20on%20Climate%20Reporting%20Legislation%202023.pdf

We present an example of this below:

Figure 5 – Total Scope 1 and 2 Carbon Intensity Separated Out for Climate Solutions Companies



Source: Storebrand analysis based on holdings from tracker ETFs / funds from Morningstar as proxy for indices. For illustration only. As at 30/06/2022.

The same point stands for Scope 3 emissions as that data becomes more widely reported and used. Asset allocation decisions made to systematically reduce top line reported TCFD metrics year on year could lead to other portfolio risks such as concentration in large, developed market companies and a reduction to emerging markets or failure to incorporate climate solutions exposures.

Conclusion – The Climate Data Conundrum

The quality and availability of corporate climate data is improving rapidly, along with our understanding of climate-related investment risks and opportunities. However, the policy pathway towards a low-carbon future remains uncertain and the transition of the global economy towards Paris-alignment is immensely complex and variable. It is not possible to objectively calculate a single climate risk/opportunity factor for every company in the world index, meaning there is no way to construct a 'passive' climate-risk alternative to a market-cap weighted global equity index. Corporate carbon emissions data can be used to systematically position companies in a portfolio but, as we have shown with our heat pumps example, the use of carbon emissions data by Scope and sector requires nuance and specialist oversight.

Our intention with this paper is not to offer insights about which companies or sectors will deliver growth in a Paris-aligned economic transition – Daikin is one of many climate solutions companies[22)] , and heat pumps one of many climate solutions technologies, that our portfolio provides exposure to in a low risk, index-like manner – rather we seek to highlight the challenges associated with systematic or 'passive' use of incomplete, evolving and nuanced climate data sets in portfolio construction.

An incomplete or inaccurate picture of climate data, at either an individual security or total portfolio level, can lead to unintended consequences in portfolio construction and a misunderstanding of climate risk exposures. Regulation is leading to increasingly accurate carbon emissions data but our research into carbon data quality highlights challenges that will persist unless specialist oversight is employed in the use of corporate climate data.

It is critical that companies and portfolios address Scope 1, 2 and 3 emissions, certainly before considering any offsetting calculations. But a failure to consider Scope 4 emissions at a top level can prevent investments in climate positive solutions and lead to a missed opportunity for investors that want to align with the transition to a low carbon or net zero economy.

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