MORNINGSTAR | SUSTAINALYTICS

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Navigating Material Climate Risks in the Global Equities Market

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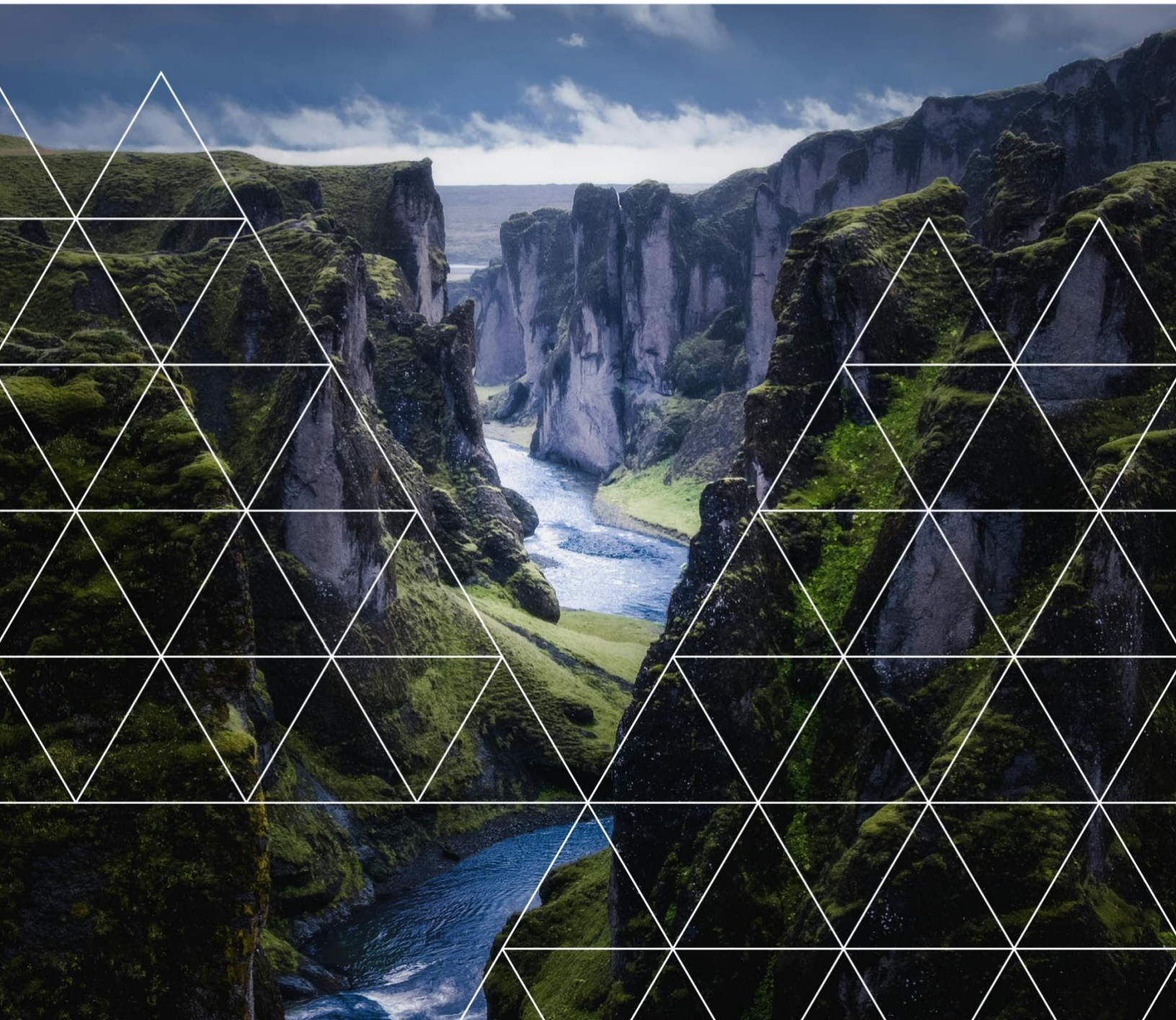

About Morningstar Sustainalytics

Morningstar Sustainalytics is a leading ESG data, research, and ratings firm that supports investors around the world with the development and implementation of responsible investment strategies. For more than 30 years, the firm has been at the forefront of developing high-quality, innovative solutions to meet the evolving needs of global investors. Today, Morningstar Sustainalytics works with hundreds of the world's leading asset managers and pension funds who incorporate ESG information and assessments into their investment processes. The firm also works with hundreds of companies and their financial intermediaries to help them consider material sustainability factors in policies, practices, and capital projects. Morningstar Sustainalytics has analysts around the world with varied multidisciplinary expertise across more than 40 industry groups. For more information, visit www.sustainalytics.com.

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Acknowledgements

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Any errors that remain are those of the authors.

Executive Summary

The intensifying concerns about climate change have reinforced investor interest in integrating Environmental, Social and Governance (ESG) considerations into their portfolio and engagement strategies. This report evaluates the alignment of companies listed on the Morningstar Global Large-Mid Cap Equities Index with the transition towards a low-carbon economy. Our analysis spans more than 3,000 public companies, representing 94% of the market capitalization of the index. We assess the extent to which companies and sectors are misaligned with net zero targets and identify industry-specific challenges and initiatives regarding emission reporting and solutions.

Despite the ambitious targets set out in the Paris Agreement,[1] the current carbon emissions trajectory falls short of what is needed to limit global average surface temperatures to 1.5 °C above pre-industrial levels. Investors face increasingly stringent carbon regulations and potential economic upheaval due to extreme weather events. We aim to help investors navigate these issues by drawing on Sustainalytics' Low Carbon Transition Rating (LCTR) and Physical Climate Risk Metrics (PCRMs), which we use to identify companies that face less low carbon transition risk than their sector peers. Investors can build on our approach to improve the alignment of their portfolios with net zero goals. Combining ESG and financial information, investors can develop a more comprehensive framework for mitigating climate-related risks, supporting sustainable solutions and capturing financial upside.

Key Insights

This Report Assesses a Broad Global Equities Index with our LCTR and PCRM products

- The LCTR covers 3,373 companies listed in the **Morningstar Global Large-Mid Cap Equities Index**, accounting for 94% of the market capitalization.
- Among the covered entities, 19% are moderately misaligned to **net zero**, while 38%, 23% and 15% are significantly, highly and severely misaligned, respectively.
- We note that **physical climate risks** vary widely, though companies in most sectors face related losses of between 1% and 5% of their operating cash flow.

10 Sector Case Studies

- While **Canadian Natural Resources** is misaligned with net zero, the firm's carbon reporting is more transparent than most of its Energy sector peers.
- Consumer and retail firms account for 33% of emissions, mostly due to scope 3 emissions. **Walmart** aims to achieve net zero operational emissions by 2040.
- **TSMC** is well positioned among IT firms in its approach to mitigating emissions. Its stock is also trading at a discount to our fair value estimate.
- About 85% of Healthcare is significantly misaligned with net zero. **Dr Reddy's Laboratories'** operations in India give the firm a more generous carbon budget.
- Life and Health Insurance is the only Financials subindustry with an average LCTR management score above 50. **Cathay FHC**'s disclosures are best in class.
- Overall, weather-related disasters have resulted in billions of dollars in losses globally. **URW** is among the REITs hedging with physical climate risk measures.
- **Siemens** is among the leading Industrials firms that are supplying the growing demand for green tech, renewables and sustainable manufacturing processes.
- Copper enables electrification. **Lunding Mining** is more aligned to net zero and less exposed to physical climate risk than most other Materials companies.
- Utilities are at the forefront of developing commercially viable transition technologies. **Corporacion Acciona Energia Renovables** is a renewables pureplay.
- Telecoms require continuous power for cables, switches and other communication infrastructure. **Vodacom** has strong GHG reduction and renewables programmes.

Introduction

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As global temperatures continue to rise and the social, environmental and economic toll of extreme weather events keeps mounting, a growing number of investors are prioritizing climate change in their investment strategies. Scientists, political representatives and civil society groups have dubbed climate change as a "threat multiplier"[2] because it can intensify the impacts of a wide range of hazards facing people's occupations, livelihoods and asset portfolios.

Climate change is among a combination of escalating concerns in the public equities market at the moment. Other factors include the potential of an impending recession, uncertainties about inflation and interest rates, and geopolitical tensions and conflicts in the Middle East (Israel-Palestine), Eurasia (Russia-Ukraine) and other regions. Intensifying the myriad of obstacles facing financial markets, climate change remains a material issue that impacts all sectors globally.

The objective of this report is to help investors navigate portfolio risks related to climate change and develop strategies to align their investment activities with the transition towards a low carbon economy. We provide actionable insights using several leading-edge Morningstar Sustainalytics tools. Our approach draws on index analysis, equity research and ESG ratings – including data from our flagship Low Carbon Transition Rating (LCTR) and Physical Climate Risk Metrics (PCRMs).

Our study sample includes 3,373 entities that are covered by the LCTR and listed on the Morningstar Global Large-Mid Cap Equities Index. This sample gives us a view on a broad cross-section of the market. While our LCTR model suggests that the activities of virtually all these companies are, to some extent, misaligned with net zero targets, we are still able to identify companies that are relatively well positioned, compared to their sector peers, on measures linked to our LCTR and PCRM (Exhibit 1).

In addition to the overall lack of company alignment with net zero targets, another trend that we discuss in this report is companies' underreporting on carbon emissions. As we enhance our LCTR model to better address this issue, particularly of underreporting on scope 3, we anticipate that the ratings of these and other companies will better reflect the significance of the gaps in their reporting. Physical climate risks vary widely and, although companies in most sectors face losses of between 1% and 5% of their operating cash flow, some outliers could be more severely affected.

Exhibit 1: Company Case Studies Discussed in this Report

Company	Domicile	Sector	Climate Risks
Canadian Natural Resources Ltd	Canada	Energy	Given that Canadian Natural Resources primarily operates in Canada, the company is increasingly exposed to regulatory risks related to carbon taxes, which are set to progressively rise.
Walmart Inc	US	Consumer Staples	Walmart's exposure to carbon risks within its own operations stems mostly from operating over 10,000 stores, which involves energy costs from refrigeration, HVAC and lighting.
Taiwan Semiconductor Manufacturing Co Ltd	Taiwan	Information Technology	TSMC is headquartered in Taiwan and operates several manufacturing sites. In January 2023, Taiwan passed the Climate Change Response Act and could levy carbon fees in 2024.
Dr. Reddy's Laboratories Ltd	India	Healthcare	As a prominent player in the pharmaceutical industry, the firm faces challenges related to carbon emissions in drug manufacturing, which significantly contributes to its carbon footprint.
Cathay Financial Holding Co Ltd	Taiwan	Financials	The firm aims to align with global ESG standards and engage with public and private sectors outside Taiwan to advance the Financial sector's role in achieving net zero targets and sustainability goals across mulitple sectors.
Unibail-Rodamco-Westfield SE	France	Real Estate	Operating in 12 countries, sustainability issues are under high scrutiny by European regulators intensifying physical climate risks may threaten the operations of URW's properties.
Siemens AG	Germany	Industrials	As a company that produces power generation equipment and technology, Siemens AG is best positioned to leverage the company's own portfolio of energy-efficient systems and technologies.
Lundin Mining Corp	Canada	Materials	The company's ESG risk exposure is driven by copper mining's significant environmental footprint and mine location in arid regions susceptible to drought.
Corporacion Acciona Energias Renovables SA	Spain	Utilities	The firm's energy mix is 74% from onshore wind, 16% from solar PV and 7% from hydropower. The company is involved in all project phases, from construction to plant operation and maintenance.
Vodacom Group Ltd	South Africa	Telecommunication Services	In South Africa, Vodacom has co-developed a solution with the national energy provider to procure and transmit renewable power from utility-scale independent power producers.

Source: Morningstar Sustainalytics

Transitioning to a Low Carbon Economy

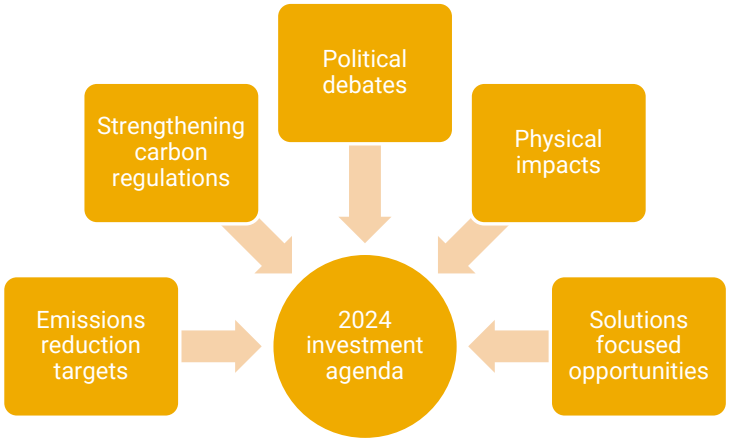
Climate change can affect investment portfolios in several ways. All sectors contribute to global warming. Moreover, climate change and carbon regulations can affect companies in all sectors of the economy. At the same time, many industries are producing innovative solutions to related environmental and social challenges. Since the Paris Agreement was adopted in 2015, progress on the climate policy front has been slow, inconsistent and far from sufficient to meet the collective target of limiting global warming to 1.5°C above preindustrial average temperatures.[3] This year signifies a crucial moment for action. As we approach a major milestone towards our near-term Paris Agreement emissions targets, investors face strengthening carbon regulations, ensuing political debates and extreme physical impacts. They also have opportunities to invest in companies that are developing relevant solutions. These factors are motivating investors to support a shift towards a low carbon economy (see Exhibit 2).

According to the Paris Agreement, greenhouse gas (GHG) emissions must peak by 2025 to keep the global average temperature within the 1.5°C threshold. That means 2024 is a crucial year for curbing emissions and assessing progress ahead of an anticipated peak of GHG emissions in 2025.[4] Government commitments to date fall far short of what is needed to keep warming to 1.5°C. The Intergovernmental Panel on Climate Change (IPCC) estimates that to limit global warming to 1.5°C with no or limited overshoot, global net human-caused carbon emissions would need to fall by about 45% from 2010 levels by 2030 and reach net zero around 2050.[5] However, the current national climate plans for 195 Parties to the Paris Agreement, taken together, would lead to an estimated increase of about 9% in global GHG emissions by 2030.[6]

Companies and investors operating in key jurisdictions must deal with tightening regulations and more granular reporting standards that will require market participants to improve the way they track, disclose and manage ESG issues. For example, starting in January 2024, more than 11,000 large companies covered by the EU's Corporate Sustainability Reporting Directive (CSRD) will be required to track and report their performance on climate-related metrics and other ESG factors.[7] Exhibit 3 highlights the

current GHG regulatory landscape and expectations for issuers and investors with respect to the reporting of GHG emissions in select markets.

Exhibit 2: Key Reasons Why Climate Change Is on Investors' Agenda in 2024



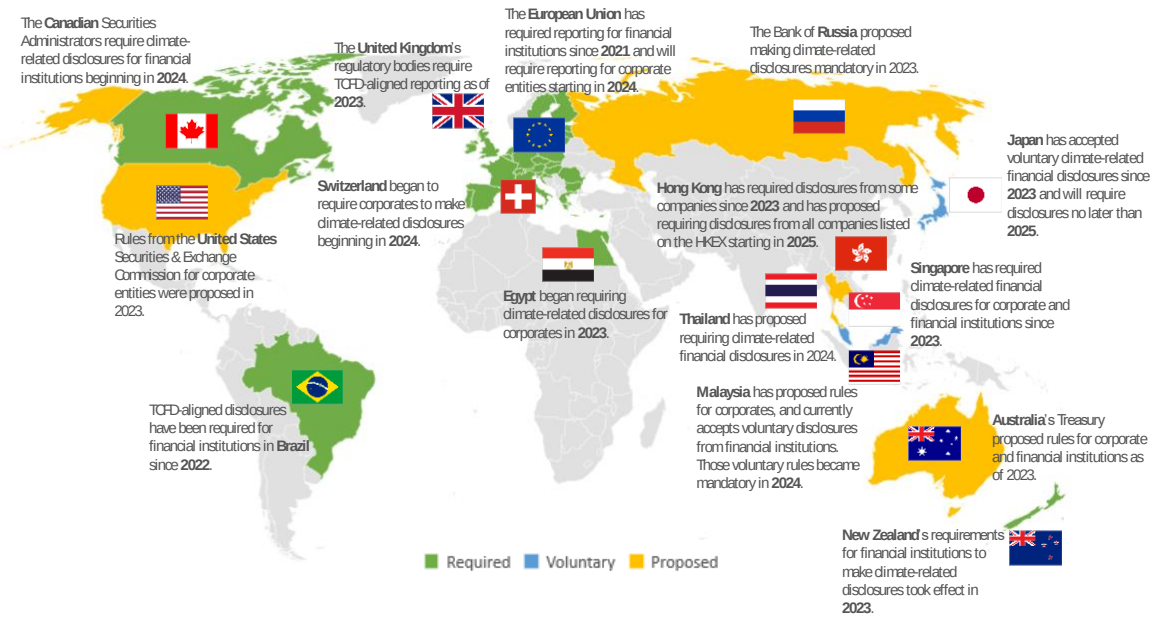
Source: Morningstar Sustainalytics

Climate change will also be among the main topics of debate in countries entering election cycles. The 2024 US presidential election will set the tone for how the country addresses climate change. When the Biden administration took office in 2021, it began to reverse policies enacted by the Trump administration, including re-entering the US into the Paris Agreement and revoking permits for the Keystone Pipeline. Other major candidates for the Democrats and Republicans, similarly, take opposing positions on environmental issues, suggesting that the outcome of the election could be pivotal in how the US addresses climate change.[8]

According to the World Meteorological Organization (WMO), 2023 was the warmest year on record and 2024 may be even warmer. The protracted El Niño event lasted into April and has been linked to droughts and floods in different parts of the world.[9] Extreme events associated with El Niño are typically associated with drier conditions in areas such as the Amazon Basin, Australia, the Indian subcontinent, the Sahel, South-East Asia and southern Africa, and wetter conditions in areas such as Central and East Asia, the Horn of Africa, the southern cone of South America and the southern US. Extreme weather events can negatively affect the production and supply chains of a wide range of commodities, from rice and wheat to fish and palm oil.[10] Other regions and the global economy could still be hit by extreme weather events, such as heatwaves, wildfires and heavy rains, which impact human health, security, water and the economy.[11] Some regions have already faced extreme whether events this year. Texas,[12] southern Brazil[13] and Dubai,[14] have recently faced floods, while droughts and extreme heat have been occurring in India and South-East Asia.[15]

For investors and companies, pressure to meet emissions targets, tightening regulations, political debates and the physical impacts of climate change present uncertainties and risks. However, these factors also represent opportunities to invest in solutions that can contribute to a more just and sustainable global economy. Solutions range from using resources more efficiently to developing renewable energy technology.

Exhibit 3: The Current GHG Regulatory Landscape and Expectations for Issuers and Investors



Source: Morningstar Sustainalytics

The data and tools that we apply in this report can be integrated into several types of use cases ranging from climate research integration and developing net zero strategies to thematic investing, engagement and voting (Exhibit 4).

Exhibit 4: Use Cases

Climate Research Integration

- Measure alignment of companies against a 1.5°C scenario.
- Deepen insights into transition risk and opportunities for portfolio management.

Implement Net Zero Strategies

- Assess forward-looking carbon emissions of companies, portfolios, funds, and benchmarks with net zero pathways.
- Meet commitments of global alliances and member groups such as the Net Zero Asset Manager Initiative and IIGCC.

Screening and Benchmarking

- Set decarbonization targets and monitor performance.
- Screen investable universe based on company exposure to, and/or management of, transition risks and TCFD reporting sufficiency.

Reporting & Client Communication

- Support TCFD-aligned regulatory reporting.
- Report to clients on how portfolios are aligned with global climate goals.
- Report to client net zero mandates.

Engagement and Voting

- Evaluate company management of transition risks and opportunities.
- Obtain transparency on corporate's disclosure sufficiency to current TCFD recommendations.
- Identify priority topics.

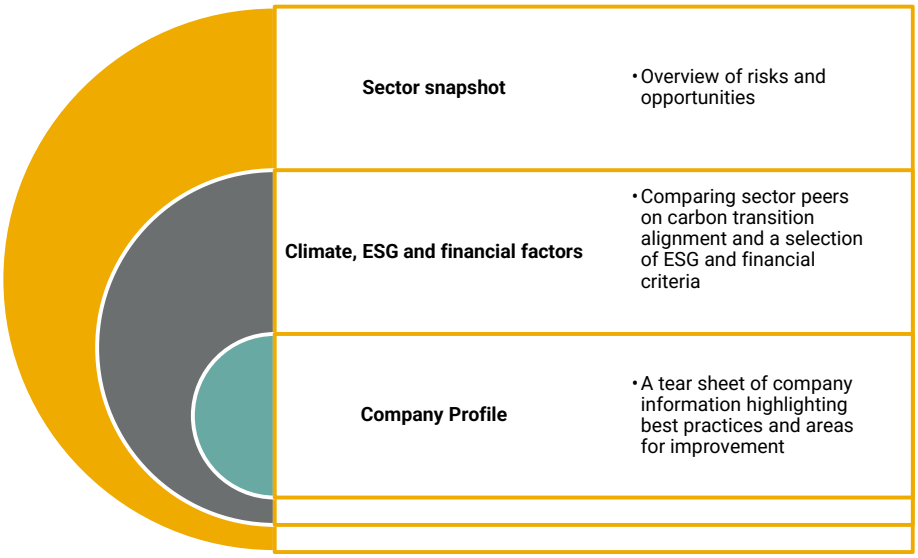
Thematic Investing

- Create climate-aware Investment products.

Sector Case Studies

The remainder of this report is structured as follows. The next section outlines the approach that we developed to arrive at our company case studies. The subsequent sections comprise an analysis of 10 broad sector groups, explaining how climate change is a material issue for key industries and highlighting a selection of companies that are most closely aligned with a low carbon economy. Each of these sections concludes with a tear sheet that provides an overview of one firm that faces less low carbon transition risk relative to its sector peers (Exhibit 5).

Exhibit 5: Structure of Sector Analysis Sections



Approach

To help investors assess the risks and opportunities associated with climate change, we take a three-step approach in assessing the global equities market: 1) we checked the extent to which our global equities index is covered by the LCTR, 2) we created a shortlist of companies in each sector that have the lowest Implied Temperature Rating, and 3) we integrated PCRM, ESG Risk Ratings and other Morningstar data to identify companies within each sector that are well positioned on the relevant issues.

Step 1: Global Equity Index and LCTR Coverage

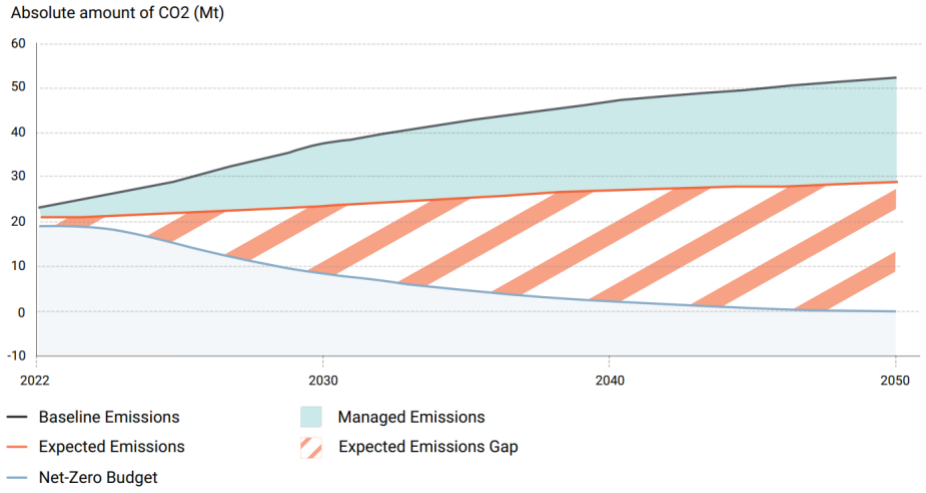
For the purposes of this study, we used the Morningstar Global Large-Mid Cap Equities Index as our investable universe. This index measures the performance of equity markets, targeting the top 90% of stocks by market capitalization.[16] The LCTR currently covers 94.6% of the weight of the index and 70.6% of the entities listed in the index.

Step 2: Implied Temperature Rating (ITR)

We ranked the companies within each sector according to their ITR, which signifies the expected level of global warming that would occur if the global economy had the same proportion of emissions misaligned to the net zero budget between now and 2050.[17] The LCTR leverages a two-dimensional framework that measures a company's

exposure from its expected emissions, while also accounting for management actions. These ratings assess companies' progress toward their stated net zero commitments by evaluating the quality and ambition of their GHG reduction targets, as well as any demonstrated short-term investment plans, policies and programs, such as a Climate Transition Resilience Program, Product Decarbonization Strategy and GHG Emissions Reduction Policy (Exhibit 6).[18]

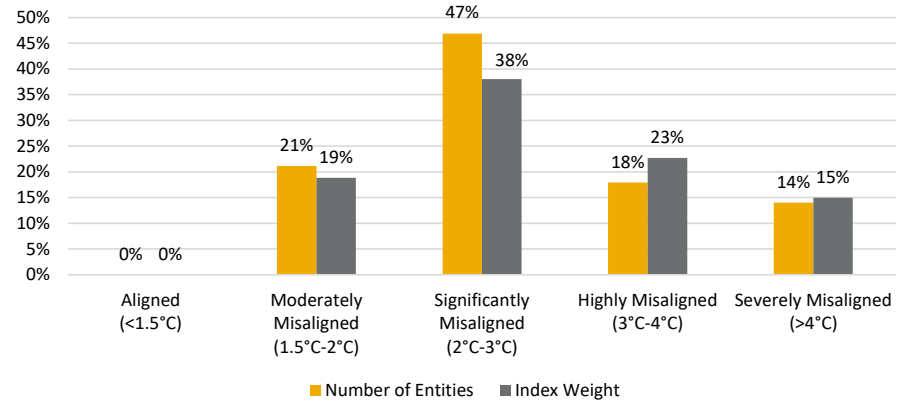
Exhibit 6: The LCTR Assesses Expected and Managed GHG Emissions



Source: Morningstar Sustainalytics

The LCTR assigns companies one of five ratings. Those with an ITR of 1.5°C or less are categorized as Aligned with the net zero target. Firms with an ITR between 1.5°C and 2°C are considered Moderately Misaligned, while those with an ITR between 2°C and 3°C are Significantly Misaligned. Firms between 3°C and 4°C are Highly Misaligned and those above 4°C are Severely Misaligned.[19] As shown in Exhibit 7, nearly half of the companies in our sample are moderately to severely misaligned, with the largest share of companies and market capitalization in the Significantly Misaligned group. This finding suggests that global equities investors have few options to fully align their portfolios with a net zero pathway. However, they can still find companies in all sectors that are managing transition risks better than their industry peers. Investors can incorporate this information with other ESG and financial data to develop best-in-class portfolio strategies.

Exhibit 7: LCTR Distribution Across the Global Large-Mid Cap Equities Index*



N=3,373 companies listed on the Global Large-Mid Cap Equities Index. **Source:** Morningstar Sustainalytics

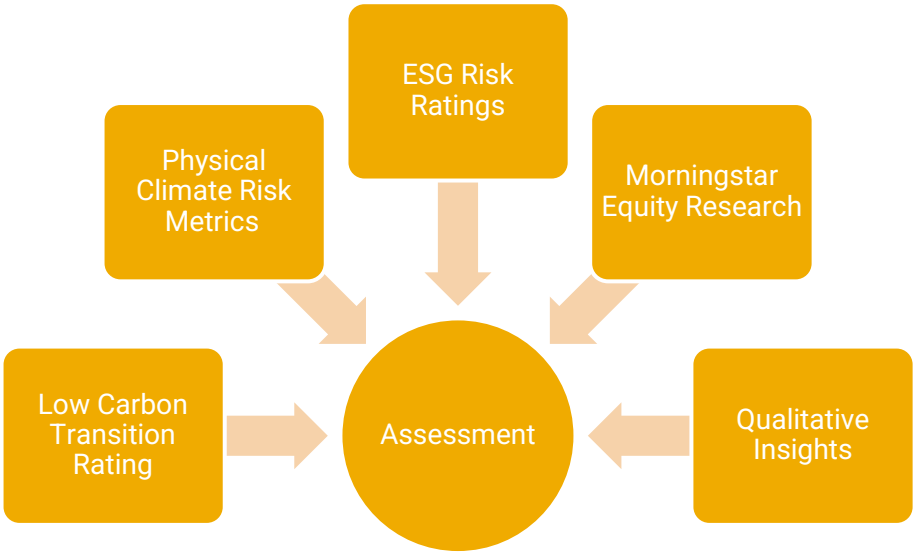
Step 3: Integrating Additional Information

For the purposes of this report, we integrate other material sources of information, including PCRM, ESG Risk Ratings and Morningstar Equity Research data (Exhibit 8). We draw on these factors to select a single firm in each sector that serves as a case study for investors to consider when assessing the overall attractiveness of stocks with respect to climate risks and other material ESG and financial criteria. For example, in addition to considering the ITR of companies in the Materials sector, we also focus on PCRMs because companies in this space are affected by physical impacts as well as transition risks. Our survey of the Real Estate sector draws on data from our ESG Risk Ratings, including indicators of physical climate risk management and green building initiatives. Our analysis of the IT sector draws on equities research, namely, Morningstar fair value estimates, which indicate whether Morningstar equity analysts consider specific stocks over, under or fairly valued by the market. We also consider qualitative information and solutions, such as companies in the Conglomerates sector developing green technologies, renewable energy infrastructure and sustainable manufacturing processes.

The Sustainalytics PCRM product offers a bottom-up assessment of physical climate risks from eight physical hazards, spanning 12 million assets and covering 135 sectors and 235 countries and territories. Investors can see their direct and indirect exposure to physical climate risks and the potential financial impacts on their portfolio companies. These metrics consider the direct and indirect exposure of a company to physical climate risks, including the risk of damage to physical assets and business disruption. These metrics are incorporated in an overall company exposure signal, reflecting the expected financial impacts due to climate change.

The PCRM Total Loss Ratio (TLR) is an estimate of the proportion of expected physical climate risk-related damages to cash flow from now until 2050. It measures whether a company is expected to be able to cover its potential physical climate risk-related losses. The PCRM Loss Amounts are the expected physical climate risk-related financial losses to a company, based on expected impacts, revenue and productivity from direct and indirect risks.

Exhibit 8: Five Sources of Information Used in Our Analysis



Source: Morningstar Sustainalytics

Energy

Fueling growth in renewables?

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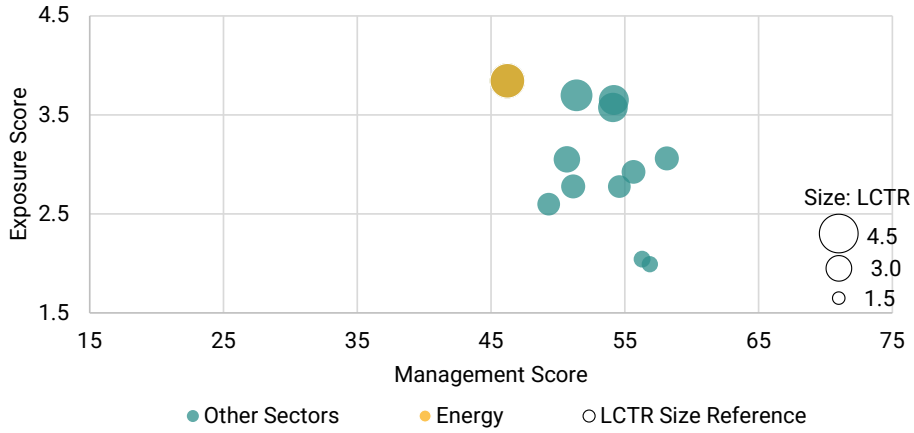
The International Energy Agency (IEA) estimates that energy accounts for more than three-quarters of total greenhouse gas (GHG) emissions globally. China and the US have the largest carbon footprint, jointly responsible for about 45% of global emissions, followed by the EU, India, Russia and Japan.[20] To help curb emissions, governments, companies and individuals have been working towards a transition from fossil fuels to renewable sources of energy. In the last few years, regulators in key markets have paved the way for investment opportunities in renewables, notwithstanding elevated interest rates, persistent inflation and slower economic growth in 2024.[21] The Energy sector, which involves the exploration, production and marketing of oil, natural gas and other energy products, is a key target of initiatives to mitigate emissions.

While macroeconomic issues continue to pose challenges, policy incentives are helping renewables stay attractive over the medium term. Global renewable energy capacity is rapidly expanding, having grown by 50% in 2023. China experienced the largest growth due to its investments in solar and, to a lesser extent, wind power. The increases in renewable energy capacity in Europe, the US and Brazil were also the highest they have ever been.[22]

While major Energy companies are diversifying their portfolios by investing in solar, wind, hydrogen and other sources of renewable energy,[23] challenges to fully transition include economic dependencies on fossil fuels and the capital intensity of developing new technology and infrastructure.[24] Policy uncertainty and inadequate regulatory frameworks can hinder progress.[25] In the US, an area of uncertainty that could have a major impact on clean energy is the outcome of the federal election. Donald Trump has stated that, if elected, he would repeal the Inflation Reduction Act, which offers incentives to accelerate the transition towards clean energy.[26]

As shown in Exhibit 9, companies in the Energy sector – which includes three industries: Oil & Gas Producers, Refiners & Pipelines, and Energy Services – is more exposed to low carbon transition risks than any other sector in our LCTR coverage. Energy firms also tend to have relatively weak management of the issue. Material risks stem from both the energy and carbon intensiveness of company operations, such as oil and gas refining, as well as the impacts of fossil fuel products. As demand for renewables continues to grow and carbon related regulations strengthen, companies must work to meet demand for greener products while also complying with more stringent standards and emerging requirements.

Exhibit 9: The Energy Sector is Highly Exposed to Carbon Risks



*N=135 Energy firms listed on the Global Large-Mid Cap Equities Index. **Source**: Morningstar Sustainalytics

Canadian Natural Resources Ltd

Navigating oil sands, emissions and regulatory risks

Domicile: Canada
Industry: Oil & Gas Producers
Subindustry: Oil & Gas Exploration and Production
Ticker: TSE:CNQ
Mkt cap: USD 82 bn*
*As of April 2024

Canadian Natural Resources Ltd (CNRL) is an independent crude oil and natural gas exploration, development and production company. The company's exploration and production activities are conducted in three geographic segments: North America, the North Sea, and Offshore Africa. These activities include exploring, developing, producing, and marketing crude oil, natural gas liquids and natural gas. The company has two divisions: Oil Sands Mining and Upgrading, Midstream and Refining. It derives most of its revenue from North America.

Although GHG emissions from burning fossil fuels account for the majority of CNRL's emissions, the company remains exposed to risks related to its production methods. These risks are primarily driven by the extraction and upgrade of extra-heavy oils and bitumen from oil sands (transformed into synthetic crude oil), which require significantly more energy than the production of lighter crude oils. Given that CNRL operates primarily in Canada, the company is increasingly exposed to regulatory risks related to the carbon tax, which is set to rise progressively. Our LCTR model suggests that under a net zero scenario, over 85% of the company's value would be at risk.

In FY2022, CNRL implemented an environmental policy that commits to using natural resources or energy in a more efficient manner. It also has a comprehensive GHG risk management system, to which the company assigns both managerial- and organizational-level responsibility for climate-related transition risks and opportunities. CNRL also states that it supports Canada's leadership in the Paris Agreement, as well as federal and provincial governments' commitments to reduce methane emissions by participating in initiatives such as Pathways Alliance. Despite these efforts, the company does not appear to disclose its scope 3 emissions with categories, and its carbon emissions intensity is well above the industry median, neither of which align with industry best practices.

In our LCTR model, Canadian Natural Resources is currently moderately misaligned to a net zero pathway. If all companies had the same investment alignment and transition preparedness as this company, our LCTR model estimates that the world would warm by 3.3˚C above pre-industrial levels. Meanwhile, the company's management of low carbon transition issues is average and we expect that the company will increase its emissions by 0.6% compared to its baseline projection.

Exhibit 10: Key Data

Company	Canadian Natural Resources Ltd
ESG Risk Rating	33.2 (High Risk)
Implied Temperature Rating	3.3
Low Carbon Transition Rating Category	Highly Misaligned
Total Loss Ratio - Discounted	-
Total Loss Ratio - Text Level	Negligible
Expected Revenue Loss Amount - Cumulative - Discounted	133,141,318.0
Morningstar Rating Overall	★★★
Moat	None
P/FV	-N/A

*As of April 2024

Source: Morningstar Sustainalytics

Consumer Goods

Operations, supply chains and consumer demand

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Climate change has become a crucial factor for investors in the Consumer Goods sector to consider because its impacts on supply chains, raw material availability and consumer preferences are more pronounced than ever. Extreme weather events, such as droughts, floods and hurricanes, have become more frequent, disrupting the supply of raw materials and the operation of manufacturing facilities.[27] Consumers are increasingly demanding products that are environmentally friendly and ethically produced.[28] Regulatory pressures related to climate change are ramping up, with governments implementing stricter environmental regulations and policies aimed at reducing carbon footprints and promoting sustainable business practices.[29] Companies that are ahead in their sustainability journey are better positioned to navigate these regulatory landscapes, avoid potential fines and capitalize on government incentives for green initiatives.

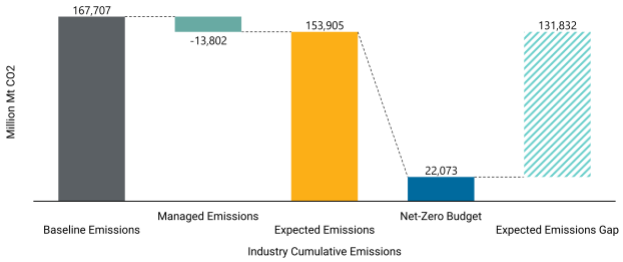
According to consulting and technology services firm, Accenture, consumer goods and retail companies are responsible for approximately 33% of global emissions, most of which is linked to their scope 3 (supply chain) footprint.[30] While many firms in this sector are making a concerted efforts to implement sustainable transition strategies by setting net zero targets and developing sustainable products and services, several industries are still heavily reliant on fossil fuels.[31] Conventional agriculture and downstream consumer product use are the largest emissions contributors for major consumer manufacturers. Traditional farming is associated with deforestation and other forms of environmental degradation, such as soil degradation, groundwater pollution and biodiversity loss.[32]

Our research universe covers two Consumer Goods sectors: Consumer Staples and Consumer Discretionary. Consumer Staples encompasses companies involved in the production or distribution of food, beverages, household goods and personal care products. Companies in food production tend to have a wider carbon footprint due to methane emissions from livestock and the use of fertilizers. Consumer Discretionary includes retailing, apparel, homebuilders and media. Companies in this sector can be carbon intensive, especially automotive manufacturers and companies involved in the production of physical goods that require energy-intensive manufacturing.

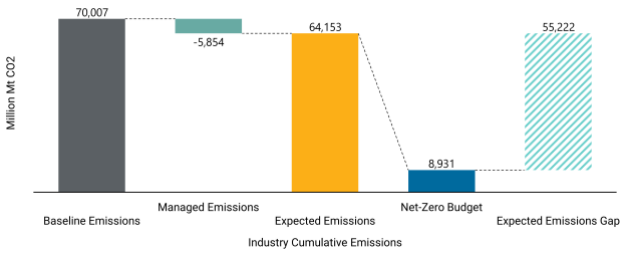
Based on our LCTR model, we expect that by 2050 these two sectors will account for 218,058 million metric tons of CO^2 in energy related emissions alone. We anticipate that each of these sectors is prepared to manage only about 9% of their baseline emissions, which is our estimate of a company's emissions in a scenario where the company does not take proactive steps to manage its emissions. Walmart is relatively well positioned in this space, though it is still moderately misaligned to net zero, with an Implied Temperature Rating of 1.7˚C.

Exhibit 11: Consumer Goods Carbon Budget and Emissions Gap

A) Consumer Discretionary



B) Consumer Staples



*N=445 Consumer Discretionary and 278 Consumer Staples firms listed on the Global Large-Mid Cap Equities Index. **Source**: Morningstar Sustainalytics

Walmart Inc.

Working to address carbon risks linked to operations and products

Domicile: United States of America
Industry: Food Retailers
Subindustry: Food Retail
Ticker: NYS: WMT
Mkt cap: USD 477 bn*
*As of April 2024

Walmart is a pre-eminent retailer in the US, with its strategy predicated on superior operating efficiency and offering the lowest priced goods to consumers to drive robust store traffic and product turnover. Walmart augmented its low-price business strategy by offering a convenient one-stop shopping destination and it generated over USD 420 bn in domestic namesake sales and USD 100 bn in international sales last year. The company serves around 240 million customers globally each week.

In Q1 2024, the company reported strong omnichannel growth, particularly in domestic e-commerce sales. Walmart's investments in supply chain automation anticipates automated service adoption by FY2026. With its vast resources, Walmart appears well positioned to enhance supply chain efficiencies and maintain its value proposition. [33] Walmart's exposure to low carbon transition risks within its own operations stems mostly from operating over 10,000 stores, which involves considerable energy costs from refrigeration, HVAC and lighting. These operational issues expose it to regulatory instruments, such as carbon pricing, building and energy efficiency standards, and refrigeration guidelines. However, on our LCTR model, only 2% of the company's value is at risk to losses linked to the transition to a low carbon economy.

Walmart has implemented a robust program to reduce its GHG emissions and aims to align with a 1.5°C trajectory. The firm aims for zero emissions across its operations by 2040, with interim targets of reducing absolute scopes 1 and 2 GHG emissions by 35% by 2025 and by 65% by 2030 from its 2015 base year. Strategies include enhancing energy efficiencies, transitioning to renewable energy sources, and employing technology to optimize energy use. Despite being named in a 2021 NGO report for GHG emissions from refrigeration leaks, Walmart maintains above-average preparedness measures to tackle environmental concerns. In March 2024, the company reported on the progress it has made with the implementation of 1 GW of clean energy projects in the US.

Walmart is significantly misaligned to a net zero pathway. If all companies had the same investment alignment and transition preparedness, we estimate that global average temperatures world would reach 2.2°C of pre-industrial levels by 2050. Without any additional targeted management or investment plans, we would expect the company to overshoot its emissions budget by 7,145,881,966 metric tons CO_2e, or 317%. While Walmart's management of its direct low carbon transition issues is strong

and we expect the company to overshoot its emissions by 19% compared to its baseline projection, it is important to note that this rating omits its scope 3 carbon footprint.

Exhibit 12: Key Data Points

Company	Walmart Inc
ESG Risk Rating	23.9 (Medium Risk)
Implied Temperature Rating	2.2
Low Carbon Transition Rating Category	Significantly Misaligned
Total Loss Ratio - Discounted	0.0
Total Loss Ratio - Text Level	Negligible
Expected Revenue Loss Amount - Cumulative - Discounted	2,529,367,399.0
Morningstar Rating Overall	★★
Moat	Wide
P/FV	1.2

*As of April 2024

Source: Sustainalytics, Morningstar

Information Technology

Materials, manufacturing and data centers

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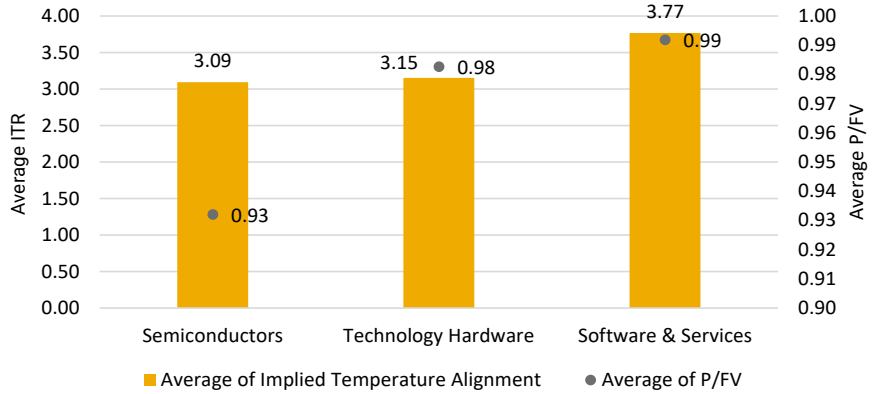
The IT sector has responded to the economic downturn and pandemic disruptions of the last few years by adjusting its workforce costs, improving efficiency and automating processes in areas ranging from robotics to optical character recognition. Over the past year, major trends that have fueled growth in the sector have included mainstream adoption of Artificial Intelligence (AI) for consumer and business applications, and automating processes to improve the efficiency of cloud computing. Other trends include the development of the metaverse as an enterprise tool for new business models, blockchain-based decentralized systems and modernizing data hubs. For IT companies, M&As may provide a potential opportunity to expand within the sector and enable digital transformations for other industries, such as real estate, manufacturing and retail.[34]

Throughout the first quarter of 2024, AI has been a dominant theme across many sectors and AI stocks have continued to attract investors.[35] AI can support aspects of climate change mitigation strategies by, for example, modelling climate projections, optimizing energy efficiency in buildings and monitoring deforestation and ocean health. However, AI also depends on energy-intensive computational power to train complex deep learning models. The growth in the AI industry has also increased the demand for hardware, which has taken a heavy toll on the environment.[36]

The tech sector emitted 36 billion metric tons of CO_2 globally in 2021, which amounts to 2-3% of global emissions. Contributing factors include energy-intensive data centers combined with unsustainable practices for the extraction of raw materials and manufacturing, transportation and the disposal of electronic devices.[37] The increasingly widespread use of AI and other intensive data processing applications is contributing to the sector's carbon footprint because both the hardware and software associated with such emerging technologies tend to be energy intensive.[38] Some tech companies are reducing their carbon footprint by switching to renewables to power their operations, using more recycled materials in products and investing in carbon capture technologies.[39] Several tech giants, such as Google and Meta, have pledged to reduce their carbon intensity, but the sector's supply chain remains carbon intensive.[40]

On average, the industries that comprise the sector are significantly misaligned with net zero targets (Exhibit 13). However, within each industry, the spread in Implied TR is significant, ranging from 1.7 to 6.7, because of the different business models and regional variances across each subindustry. Taiwan Semiconductor Manufacturing (TSMC) stands out as relatively well positioned, with an ITR of 1.8°C. The firm also trades at a discount, according to Morningstar's fair value estimate, with a price to fair value ratio of 0.69, well below the industry average of 0.93.

Exhibit 13: Comparing IT Industries on ITR (°C) and P/FV



*N=183 firms companies listed on the Global Large-Mid Cap Equities Index. **Source**: Morningstar Sustainalytics

Taiwan Semiconductor Manufacturing Co.

Surging demand for chips could grow caron emissions along with revenue

Domicile: Taiwan
Industry: Semiconductors
Subindustry: Semiconductor Design and Manufacturing
Ticker: TAI: 2330
Mkt cap: USD 644 bn*
*As of April 2024

TSMC is the world's largest dedicated chip foundry, with almost a 60% market share.[41] TSMC's scale and high-quality technology allow the firm to generate solid operating margins, even in the highly competitive foundry business. The shift to the fabless business model in the industry has created tailwinds for TSMC. The foundry has a distinguished customer base, including Apple, AMD and Nvidia, which applies cutting-edge process technologies to its semiconductor designs.

The firm is positioned to continue to benefit from the surge in AI applications, which contribute to demand for TSMC's chips. The integration of AI into servers is the first phase of its broader adoption. A diverse range of AI functionalities will be integrated in various devices, including smartphones, industrial machinery and other products.[42] According to Morningstar Equity Research, TSMC's stock is also trading at a 31% discount to our fair value estimate.

The potential of increasing costs associated with carbon emissions is among the regulatory risks facing the firm. In January 2023, Taiwan passed the Climate Change Response Act and could levy carbon fees as early as this year. Additionally, concerns regarding the availability of sufficient electricity and changes in energy policy in Taiwan could result in increased energy costs.

TSMC's ESG steering committee reviews the company's climate change strategies and goals, and reports to the board of directors on a quarterly basis. TSMC has a company-wide target to reach net zero emissions by 2050. Additionally, it has an interim target of reducing its scope 1 and 2 carbon emissions to its 2020 level (9.5 million $mtCO_2e$) by 2030. In terms of a renewable energy program, TSMC has a target to use 40% renewable energy for all TSMC fab operation sites by 2030. It used 100% renewable energy for its global offices in 2021. In the same year, it collaborated with more onshore wind farms, increasing renewable energy usage in its Taiwan fabs. However, its carbon intensity is well above the industry median, suggesting there is room for improvement.

TSMC is currently moderately misaligned to a net zero pathway. If all companies had the same investment alignment and transition preparedness as this company, it is estimated that the world would warm by 1.8°C above pre-industrial levels. The company's exposure is moderately misaligned, which suggests that without any management or investment, the company would be expected to overshoot its emissions budget by 358,057,137 metric tons of CO_2e, or 132.1%. While the company's management of low carbon transition issues is relatively strong, its ITR is driven by the company's scope 1 emissions and less weight is attributed to its scope 3 emissions.

Exhibit 14: Key Data Points

Company	TSMC
ESG Risk Rating	13.5 (Low Risk)
Implied Temperature Rating	1.8
Low Carbon Transition Rating Category	Moderately Misaligned
Total Loss Ratio - Discounted	0.0
Total Loss Ratio - Text Level	Negligible
Expected Revenue Loss Amount - Cumulative - Discounted	1,864,675,239.0
Morningstar Rating Overall	★★★★
Moat	Wide
P/FV	0.8

*As of April 2024

Source: Sustainalytics, Morningstar

Healthcare

A check-up on the sector's carbon footprint

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The Healthcare sector is leveraging advances in cutting edge technologies to provide new services and products to customers and patients around the world. In 2024, key technology trends in this space range from the application of generative AI and more personalized medicine to the development of virtual healthcare assistants, telemedicine and preventative healthcare. Some firms are advancing medical applications of augmented reality, 3D printing and developing digital twins of the human body to simulate treatments.[43] These and other advances in the sector contribute to its role in improving global health and wellbeing.

Global health crises, such as the Covid-19 pandemic, have brought to light the inherent connection between physical and mental health and the opportunities to offer more holistic services. For instance, primary care physicians are assessing how mental health may impact treatment and the recovery of physical illnesses.[44]

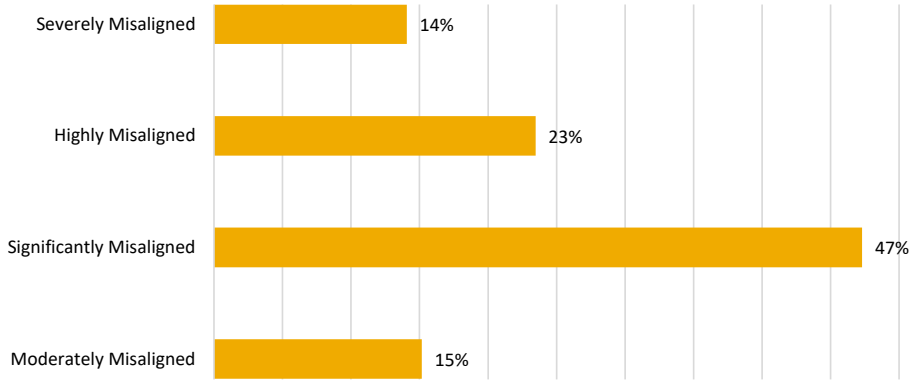
While we see many positive trends in this space, Healthcare also contributes to global CO_2 emissions though its operations (scope 1) and indirect emissions from purchasing energy, goods and services, such as those related to pharmaceuticals and other products. The effects of climate change, including increasing temperatures, extreme weather events, rising sea levels, and heightened concentrations of atmospheric pollution contribute to various health conditions.[45]

Scope 3 upstream emissions account for over 80% of the sector's emissions from the procurement of equipment and chemicals required to manufacture their products. This category includes indirect emissions from the production and transportation of goods and services, encompassing activities ranging from the production of pharmaceuticals and medical devices to the transport of these items and waste management.[46]

Healthcare companies can contribute to solutions in various ways, including improving energy efficiency and reducing their reliance on carbon intensive energy supplies, reducing indirect emissions through more sustainable uses of materials, and engaging suppliers and collaborating with healthcare providers, tech firms and governments.[47]

Based on our LCTR model, 85% of the sector is significantly (2-3°C), highly (3-4°C) or severely (3-4°C) misaligned with a net zero pathway. Only 15% of companies in our sample have a moderately misaligned rating (1.5-2°C), including 15 pharmaceutical companies, eight biotech firms and a smaller number of companies that focus on medical devices, distribution, facilities and supplies (Exhibit 15). Drug manufacturing is carbon-intensive, primarily owing to the production process, which accounts for 60% of the pharmaceutical companies' carbon footprint. Risks associated with excessive carbon emissions include fines, carbon taxes and loss of projected sales for certain markets. Early stage pharmaceutical and biotech firms are less exposed to carbon risks because they tend to focus on R&D activities, rather than on large scale production.

Exhibit 15: Distribution of Healthcare Companies Across Alignment Groups



*N=277 firms listed on the Global Large-Mid Cap Equities Index **Source**: Morningstar Sustainalytics

Dr. Reddy's Laboratories Ltd

Global pharmaceuticals company with a footprint in 75 countries

Domicile: India
Industry: Pharmaceuticals
Subindustry: Pharmaceuticals
Ticker: BOM:500124
Mkt cap: USD 11 bn*
*As of April 2024

Being one of the largest generic drug manufacturers in the world, Dr. Reddy's has a significant presence in North America, a region that makes up roughly half of its generics sales. Beyond simple generics, Dr. Reddy's also has a solid portfolio of injectables, which make up 25% of its North America sales. In branded generic markets such as India, Dr. Reddy's has established a compelling presence with its strong brand name and has earned a top five spot in key therapeutic areas including oncology and gastroenterology. The company also has an active pharmaceutical ingredient business that manufactures over 150 APIs and sells in over 75 countries.

As a prominent player in the pharmaceutical industry, the firm faces challenges related to carbon emissions during drug manufacturing, which significantly contributes to its carbon footprint. The company's management of scope 3 upstream emissions is severely misaligned, accounting for 26% of the firm's managed emissions, compared to 53% of its managed emissions, which account for 53% of its managed emissions. Regulatory pressures, particularly from initiatives that aim for carbon neutrality by 2050 (e.g. the EU Green Deal), pose additional challenges, especially regarding environmental assessments for medicine authorization. Despite exemptions for F-gases used in metered-dose inhalers (MDIs), operational risks may increase. Dr. Reddy's, like the broader pharmaceutical industry, will have to reduce carbon intensity to align with the Paris Climate Agreement, a target that remains largely unmet.

Amidst these challenges, Dr. Reddy's is positioned to capitalize on the growing preference for drug manufacturing with a smaller carbon footprint. As healthcare providers, including the UK NHS,[48] strive for carbon neutrality, demand for environmentally sustainable drug manufacturers pharmaceuticals is on the rise. Reducing emissions presents significant business opportunities for Dr. Reddy's, driving efficiencies, cost savings, and enhancing brand competitiveness. The company can lead carbon reduction initiatives by setting science-based emission reduction targets, implementing internal carbon pricing and prioritizing green chemistry in R&D for medicines with a smaller carbon footprint.
On our LCTR model, Dr. Reddy's is moderately misaligned with a net zero pathway. If all companies had the same investment alignment and transition preparedness as Dr.

Reddy's, we estimate that the world would warm by 1.8˚C above pre-industrial levels. Still, the company's management of low carbon transition issues is strong and we estimate that the firm will decrease its emissions by 31.1% compared to the baseline. With that said, an important driver of its ITR is its operations in India, which provides the company with a more generous carbon budget because, under the Inevitable Policy Response (IPR) Required Policy Scenario (RPS), India is expected to decarbonize at a slower rate than other regions.

Exhibit 16: Key Data Points

Company	Dr Reddy's Laboratories Ltd
ESG Risk Rating	23.6 (Medium Risk)
Implied Temperature Rating	1.8
Low Carbon Transition Rating Category	Moderately Misaligned
Total Loss Ratio - Discounted	0.0
Total Loss Ratio - Text Level	Negligible
Expected Revenue Loss Amount - Cumulative - Discounted	49,064,805.0
Morningstar Rating Overall	★★★★★
Moat	None
P/FV	-N/A

*As of April 2024

Source: Sustainalytics, Morningstar

Financials

Gaps in emissions disclosures and ESG integration

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Climate change is a growing concern in the Financial sector. Physical risks include the potential for direct impacts on assets, such as financial institution premises, data centers and IT infrastructure, which can be affected by extreme weather events (e.g. hurricanes, floods wildfires). Indirect impacts include the broader effects of climate change on the global economy. Transition risks include policies that increase the price of emitting carbon for investable companies and restrict the financing of carbon intensive projects.

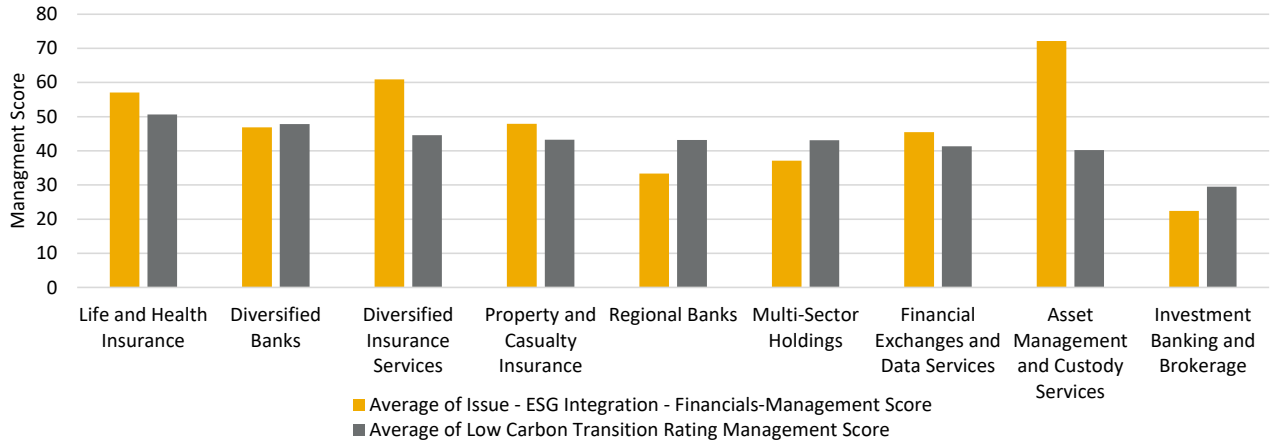
Many financial institutions have communicated their commitment to net zero and Paris-aligned net zero goals. However, according to a Deloitte survey study, relatively few banks have committed to reducing scope 3 emissions (financed emissions from their own investments and loan issuance), which represent over 75% of their carbon emissions.[49] Scope 3 emissions are a challenge due to the significant discrepancies in company reporting. In the light of a changing regulatory landscape with growing expectations that financial institutions will reduce their carbon footprint, companies in the sector will have to address data gaps and develop transition plans with their clients to ensure that they can achieve interim targets and real actions beyond long-term pledges.[50]

In lieu of scope 3 emissions data, investors can assess companies in this sector by considering their performance on other relevant criteria. Exhibit 17 shows the mean scores of companies in nine industries on two Morningstar Sustainalytics datapoints: management scores on our ESG Integration in Financials MEI (Material ESG Issue) and Low Carbon Transition Rating.

ESG Integration scores assess the quality of a company's plan to incorporate ESG issues in its financial services to the corporate sector and individuals, including ESG risk assessments, monitoring and audits. Climate change and sustainability issues have become prominent factors in investment decisions, as investors seek to lower their risk, maximize their returns and look for profitable investment opportunities. Only three of the nine subindustries have management scores above 50 (adequate). This finding suggests that most subindustries in this sector are underprepared to mitigate climate risks.

Life and Health Insurance is the only subindustry with an average score at or above 50 on our LCTR management assessment. Still, companies in this subindustry have been involved in controversies over the carbon impact of their products, driven by NGO reports on insurers' investing in firms engaged in carbon intensive activities.

Exhibit 17: Comparing Financials Industries on ESG Integration and Carbon Transition Management Issues



*N=467 firms listed on the Global Large-Mid Cap Equities Index; Reinsurance, Thrifts and Mortgages excluded due to the small number of sampled firms in those industries.

Source: Morningstar Sustainalytics

Cathay Financial Holding Co Ltd

Insurance, banking and asset management

Domicile: Taiwan
Industry: Insurance
Subindustry: Life and Health Insurance
Ticker: TAI:2882
Mkt cap: USD 21 bn*
*As of April 2024

Cathay Financial Holding Co. (FHC), a major player in Taiwan's Financial sector, operates as a central hub for insurance, banking and asset management. With a strategic emphasis on cross-selling and IT integration, the company evenly divides its revenue between life insurance and consumer/corporate banking services. As large-scale institutional investors, Cathay FHC and others in the industry face increasing scrutiny for financing ventures that contribute to societal and environmental harm. Taiwan has been strengthening its climate policies and its Climate Change Response Act mandates significant reductions in GHGs, which places substantial compliance obligations on companies with operations in this market, including adopting renewable energy sources and reducing their carbon footprint.[51]

The company emphasizes that its digital transformation journey has significantly propelled growth, with the total digital user base surpassing 8.6 million across all its businesses. Cathay FHC, which initiated its digital transformation eight years ago, is positioned to stick with its inaugural AI guidelines and continue to explore strategic projects in Federated Learning, Synthetic Data, and RAG (Retrieval Augmented Generation) models.[52]

In 2023, Cathay FHC established a partnership with the World Climate Foundation (WCF) and has contributed to international climate events to discuss critical sustainability topics, including climate change, resilience and biodiversity. The firm aims to align with global ESG standards and engage with public and private sectors outside Taiwan to advance the Financial sector's role in achieving net zero targets and sustainability goals across multiple sectors.[53]

Cathay FHC is moderately misaligned with a net zero pathway. If all companies had the same investment alignment and transition preparedness as this company, we estimate that the world would warm by 1.7˚C above pre-industrial levels. The company's exposure is moderately misaligned, which reflects that without any management or investment, the company would overshoot its emissions budget by 940,262 metric tons CO_2e or 69.4%. Scope 3 emissions are omitted from this assessment, which would otherwise result in a higher ITR. Still, the company's management of low carbon transition issues is strong compared to its sector peers and we expect that the company will decrease its emissions by 3.2% compared to its baseline projection.

Exhibit 18: Key Data Points

Company	Cathay Financial Holding Co Ltd
ESG Risk Rating	12.1 (Low Risk)
Implied Temperature Rating	1.7
Low Carbon Transition Rating Category	Moderately Misaligned
Total Loss Ratio - Discounted	N/A
Total Loss Ratio - Text Level	N/A
Expected Revenue Loss Amount - Cumulative - Discounted	N/A
Morningstar Rating Overall	★★
Moat	-N/A
P/FV	-N/A

*As of April 2024 **Source**: Morningstar Sustainalytics

Real Estate

Real value at stake

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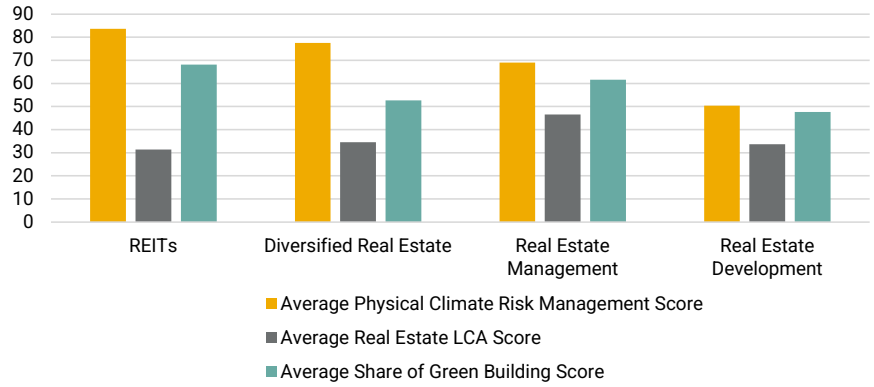
As climate change is having an increasingly profound impact on real estate and other physical assets around the world, international organizations are taking measures to mitigate risks. In September 2023, the European Commission stated that its emergency aid reserve for climate-fueled crises were exhausted in both 2021 and 2022, and requested a 400% increase in assistance over the subsequent two years.[54] The US National Oceanic and Atmospheric Administration (NOAA) reported the highest number of billion-dollar disasters in 2023.[55] Meanwhile, the Asia-Pacific region has experienced an average of six disasters a year for the past three decades, approximately twice as many as Latin America and the Caribbean, and three times as many as sub-Saharan Africa.[56]

Climate and weather-related disasters have resulted in billions of dollars in losses, including damage and destruction of properties, which impact the regular operations of real estate companies and their portfolios, along with decreased asset values due to an inability to adequately underwrite properties in high-risk areas for extreme weather events. Additionally, failing to meet regulatory standards on environmental performance may prevent buildings from being sold or leased.[57] Buildings with poor energy and water efficiency cost more to operate. We assess companies in this sector on several relevant management criteria, including their management of physical climate risks, green building proliferation and whether carbon life cycle assessments are undertaken.

As shown in Exhibit 19, within the Real Estate sector, REITs and Real Estate Managers tend to exhibit stronger performance under physical climate risk management, which examines measures to adapt or mitigate impacts from extreme weather. They also tend to have higher scores due to their share of green buildings (the proportion of the portfolio with green building certifications) and Real Estate life cycle assessment (LCA), which is a full assessment of carbon impacts from construction, use, to end of life disposal. A key driver of this trend is their ownership and financial interests in protecting the value of their property portfolio and minimizing operating costs by efficient resource use. Real Estate Developers do not typically have the same long-term ownership interests as REITs or managers; once they sell a property, it becomes the client's responsibility, so the impetus for developers to implement comprehensive measures in this area (outside regulations and market demand) is lower than it would be for operators, who have a long-term vested interest in a property.

These criteria are especially important for companies to address when they operate an extensive portfolio of properties across different markets with elevated investor and regulatory standards. Unibail-Rodamco-Westfield SE is an example of a company leading on all four of these criteria, with a score of 100 on each of them.

Exhibit 19: Comparing Real Estate Subindustries on Climate Management



*N=527 firms listed on the Global Large-Mid Cap Equities Index
Source: Morningstar Sustainalytics

Unibail-Rodamco-Westfield SE

Malls, offices and mixed-use assets

Domicile: France
Industry: Real Estate
Subindustry: REITs
Ticker: PAR: URW
Mkt cap: USD 11 bn*
*As of April 2024

Unibail-Rodamco-Westfield (URW) owns a portfolio of quality malls, about two-thirds of which are in continental Europe. Since acquiring Westfield in 2018, URW also has about 10% in the UK and about a quarter in the US, but it plans to drastically reduce exposure to the latter. More than 90% of rent comes from shopping centers, the remainder from offices, mostly Paris, as well as some offices attached to mixed-use assets around the world, and a similar amount from a conventions and exhibitions business in France.

The firm saw 3.3% growth in adjusted EPS in 2023, driven by recovering rents and reduced expenses. However, the Covid-19 pandemic disrupted URW's earnings and stalled asset sales, prompting a need to reduce debt. Despite financial pressures, URW adapted its operational strategies, scaled back development projects, and explored alternative options for asset sales and partnerships. Looking ahead, URW's malls are expected to perform strongly, particularly as low-quality malls in the US close, with potential rent benefits from high inflation and strong retail demand.[5]

Operating in 12 countries, sustainability issues are under high scrutiny by European regulators and the public, motivating property owners to reduce the environmental impacts of their operations. Intensifying physical climate risks may threaten the operations of URW's properties, impacting profitability. Overall, the company's material ESG risk exposure is low and in line with the subindustry average.

A CSR Steering Committee oversees URW's ESG issue management, suggesting that sustainability issues are integrated into the firm's core business strategy. Furthermore, URW has a strong policy governing environmental matters and executive compensation is explicitly linked to ESG performance targets. We assess the company's management of material ESG issues as strong.

URW is significantly misaligned to a net zero pathway. If all companies had the same investment alignment and transition preparedness as this company, we estimate that the world would warm by 2.1˚C above pre-industrial levels. The company's exposure is significantly misaligned, which implies that without any management or investment, the company would overshoot its emissions budget by 74,800,559 metric tons CO_2e, or 254%. Meanwhile, the company's management of low carbon transition issues is strong and we expect the company to decrease its emissions by 18.4% compared to its baseline projection.

Exhibit 20: Key Data Points

Company	Unibail-Rodamco-Westfield Act
ESG Risk Rating	4.7 (Negligible Risk)
Implied Temperature Rating	2.1
Low Carbon Transition Rating Category	Significantly Misaligned
Total Loss Ratio - Discounted	N/A
Total Loss Ratio - Text Level	N/A
Expected Revenue Loss Amount - Cumulative - Discounted	N/A
Morningstar Rating Overall	★★★★
Moat	None
P/FV	0.8

*As of April 2024

Source: Sustainalytics, Morningstar

Industrials

Hedging by investing in diversified business models

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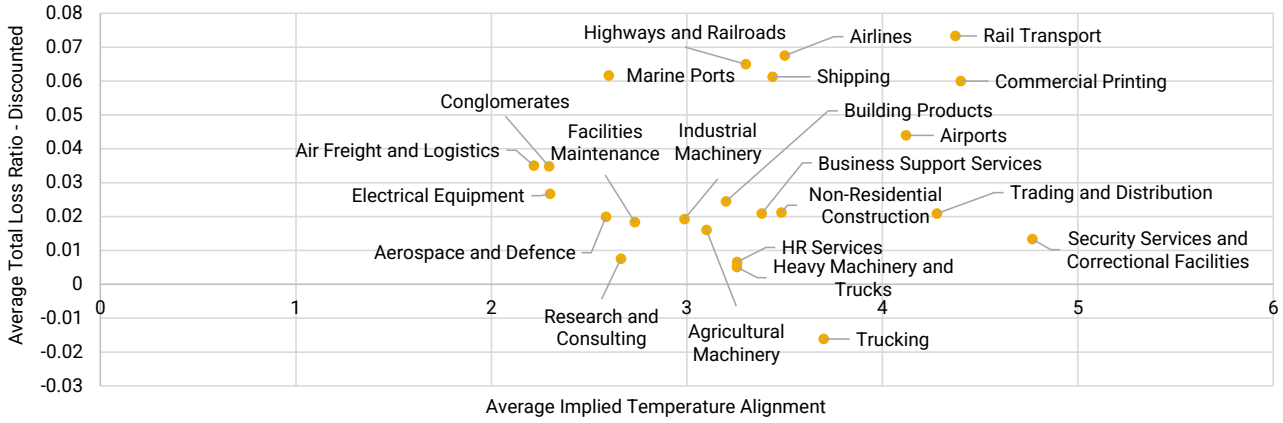
The Industrials sector faces a host of material risks associated with climate change, which can affect the operations, supply chains and financial performance of companies in this space. A challenge in assessing these risks is the complexity and diversity of the various business models covered in this sector, including segments as disparate as Industrial Conglomerates, Traders & Distributors and Aerospace & Defense. Factors that unify companies in the sector include their capital intensity, their leadership in innovation and their roles in the production and distribution of goods and services.

Companies in this sector are vulnerable to climate risks because they tend to be energy-intensive and heavily reliant on global supply chains. As governments around the world implement stricter environmental regulations and carbon pricing mechanisms to mitigate climate change, the sector may face increased costs of compliance, changes in market demand and expenses related to investing in cleaner technologies. With extreme weather events occurring more frequently, the sector could experience production disruptions, damage to infrastructure and financial losses.

However, investors and firms in the sector also stand to benefit from innovations that supply the growing demand for green technologies, renewable energy infrastructure and sustainable manufacturing processes. Companies that proactively adapt to environmental regulations, invest in energy efficiency, and develop climate-resilient business models can gain a competitive edge and attract investments.

As shown in Exhibit 21, transportation related industries, including Highways and Railroads, Marine Ports, Airlines, Shipping and Rail Transport, tend to have higher TLRs due to their relative cash flows and the high value of their infrastructure and operational logistics that are exposed to acute and chronic climate events. Conglomerates have a lower average ITR than most other industries in this sector. Still, they generally have large operations and consume a significant amount of energy to power their facilities. The average TLR of the industry is around 3.5%, which is comparable to that of most other industries in this sector. German multi-industry conglomerate Siemens AG leads its peers with an ITR of 2.1˚C and a TLR of around 1%.

Exhibit 21: Assessing Industrials Companies on Physical Climate Risks and Net Zero Alignment



N=343 Industrials firms listed on the Global Large-Mid Cap Equities Index

Source: Morningstar Sustainalytics

Siemens AG

Supporting the charge towards greater energy efficiency

Domicile: Germany
Industry: Industrial Conglomerates
Subindustry: Conglomerates
Ticker: ETR:SIE
Mkt cap: USD 147 bn*
*As of April 2024

Siemens is a multi-industry company focused on the areas of Digital Industries, Smart Infrastructure, Mobility and Siemens Healthineers.[58] Its top three geographic regions — the US, Germany and China — contribute over half the company's revenue. Siemens has a 75% investment in separately listed Siemens Healthineers. Recent portfolio activity includes the listing of Siemens Energy, and the spin-off of its power and gas, and Siemens Gamesa business divisions in 2020.

As a company that produces power generation equipment and technology, Siemens is well positioned to leverage its own portfolio of energy-efficient systems and technologies. Industrial conglomerates engaged in manufacturing require substantial amounts of energy for their operations, encompassing manufacturing processes, lighting, heating and cooling. Effective energy management is crucial for mitigating risks stemming from energy price fluctuations and carbon regulations. Energy management initiatives can yield substantial cost savings, potentially reaching USD 20 mn annually for such conglomerates. Best practices entail implementing energy efficiency measures across the organization, integrating renewable energy sources, adhering to ISO 14001 and ISO 50001 environmental and energy management standards, and transparently reporting emissions data. The industry is progressing in energy efficiency, with firms setting ambitious goals such as carbon neutrality and investing in advanced energy-efficient technologies.

Based on our LCTR model, Siemens AG is moderately misaligned to a net zero pathway. If all companies had the same investment alignment and transition preparedness as this company, we estimate that the world would warm by 1.9˚C above pre-industrial levels. The firm's management of low carbon transition issues is strong and we expect the company to decrease its emissions by 18.8% compared to its baseline projection.

It is worth noting that among all scopes of value chain analysis in our LCTR model, Siemens is severely misaligned on scope 3 – Upstream. Without considering its management preparedness and investment plans, Siemens' baseline emissions projection is Moderately Misaligned with a net zero budget. It is expected that the company will overshoot its cumulative emissions budget by 11,823,958,747 metric tons of CO_2e by 2050, which is 209% above its net zero budget. This level of emissions would lead to global warming 2.0˚C above pre-industrial levels if the global economy were on the same trajectory. The company's reporting on scope 3 emissions is lacking and we anticipate that these emissions will increase.

Exhibit 22: Key Data Points

Company	Siemens AG
ESG Risk Rating	25.8 (Medium Risk)
Implied Temperature Rating	2.1
Low Carbon Transition Rating Category	Significantly Misaligned
Total Loss Ratio - Discounted	0.0
Total Loss Ratio - Text Level	Negligible
Expected Revenue Loss Amount - Cumulative - Discounted	1,506,694,901.0
Morningstar Rating Overall	★★★★
Moat	Wide
P/FV	1.0

*As of April 2024

Source: Sustainalytics, Morningstar

Materials

Metals and minerals enabling the transition

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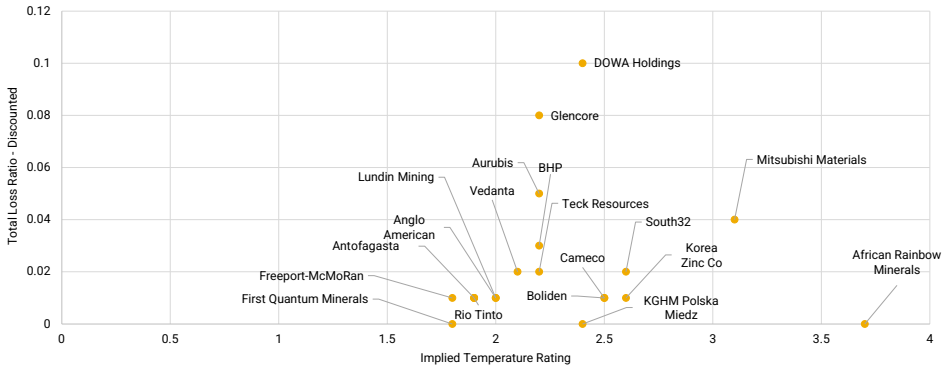
Everything is built from something. While circular economies and recycling are consistent with a sustainable green economy, getting to a low-carbon economy is a material-intensive process. Despite uncertainties, any decarbonization path to 2050 will require more minerals and metals. The switch away from fossil fuels to renewable energy will increase the demand for metals in several ways. Relevant drivers of metal demand include increasing the capacity to generate clean energy (e.g. solar and wind power), developing the infrastructure needed to deploy clean technologies (e.g. transmission networks, electric vehicles), and increase energy storage capabilities (batteries). For example, the demand for copper is expected to increase significantly, and this base metal has applications across multiple energy technologies, as it is largely used for wires in electrical components.

Despite metals' ubiquity, mining companies have historically struggled to secure the funding needed. The highly cyclical nature of the commodities markets and the wildly uncertain journey from finding to developing a mine are key factors at play. Mines can take anywhere from 10 to 20 years from discovery to production. During this time, companies need to successfully navigate complicated regulatory requirements and meet the increasingly taxing social license to operate requirements. While contributing to the green transition, mining companies are under pressure to move away from fossil fuel powered infrastructure to EV trucks, to decarbonize, to electrify and to automate.

The Mining industry is highly exposed to physical climate risks. Extreme weather events such as excessive rain can lead to flooding and operational interruptions. On the other side of the spectrum, a lack of enough water can jeopardize productivity. Access to water in arid regions and the competing needs for limited supplies can lead to production curtails, non-compliance costs or community opposition, which can have negative impacts on profitability and growth.

Exhibit 23 plots the performance of 20 diversified mining companies on two relevant measures. TLR indicates the difference between the expected physical climate risk-related damages facing companies and their cash flow from now until 2050. On average, the TLR of firms in this sample is 0.023, indicating that their cumulative annual exposure to physical impacts would amount to about 2.3% of their cash flow by 2050. The average ITR of the sample is 2.7˚C, suggesting that there is still significant room for improvement. Lunding Mining Corporation stands out as being more aligned (ITA of 1.9˚C) and less exposed to physical climate risk (TLR of 0.01) compared to most firms in the sample.

Exhibit 23: Assessing Diversified Mining Companies on Physical Climate Risks and Net Zero Alignment



*N=18 Diversified Mining companies listed on the Global Large-Mid Cap Equities Index. **Source:** Morningstar Sustainalytics

Lundin Mining Corp

A copper focused mining company

Domicile: Canada
Industry: Diversified Metals
Subindustry: Diversified Metals Mining
Ticker: TSE:LUN
Mkt cap: USD 9 bn*
*As of April 2024

Lundin Mining Corp is a diversified Canadian base metals mining company. In FY2023, copper accounted for 71% of revenue, while the balance came from the sale of zinc, nickel, gold, molybdenum, lead and silver. The firm's Chilean mines, Candelaria and Caserones (acquired in 2023), contributed 57% of its sales in FY2023; the remainder came from its mines in Brazil, the US, Portugal and Sweden.

The company's ESG risk exposure is driven by copper mining's significant environmental footprint and mine location in arid regions susceptible to drought. In Chile, where its largest copper mines are located, concerns over water availability have led to intense community opposition to existing and proposed mining projects, legal action and increased regulatory requirements, which could result in increased operating costs, fines and penalties. The country has a history of worker protests. Industrial action could lead to production stoppages should Lunding fail to adequately address human capital issues and its relationship with unions.

On the positive side, the company's ESG management is strong, backed by comprehensive policies and implementation programmes, and a solid performance. Aligned with best practices, the board oversees ESG issues and sustainability performance targets are factored into executive compensation. Lundin has implemented initiatives to reduce GHG emissions and increase energy consumption from renewable energy sources: it has a 2030 goal of reducing scope 1 and 2 GHG emissions by 35% emissions, from 2019 levels; has developed site-specific decarbonization roadmaps; and is making progress evaluating scope 3 emissions across its value chain (though its reporting on this issue has significant room or improvement). The firm is investing in renewables and expects to provide a minimum 80% to the energy mix at its Candelaria mine.

Lundin is leading the industry in terms of ESG risk management, scoring above average on our Risk Rating. Although it is bound to capitalize on its copper focus, given the importance of copper in the low-carbon transition, the company is moderately misaligned to a net zero pathway based on our model. If all companies had the same investment alignment and transition preparedness, we estimate that the world would warm by 2.0˚C above pre-industrial levels. The company's exposure is moderately misaligned with net zero, which indicates that without any management or investment, the company would be expected to overshoot its emissions by 179%. This gap is significant, but compared to its sector peers, Lundin's management of low carbon transition issues is average and we expect the company to decrease its emissions by 10.9% compared to its baseline projection.

Exhibit 24: Key Data Points

Company	Lundin Mining Corp
ESG Risk Rating	28.1 (Medium Risk)
Implied Temperature Rating	2.0
Low Carbon Transition Rating Category	Moderately Misaligned
Total Loss Ratio - Discounted	N/A
Total Loss Ratio - Text Level	N/A
Expected Revenue Loss Amount - Cumulative - Discounted	N/A
Morningstar Rating Overall	★★
Moat	None
P/FV	-N/A

*As of April 2024

Source: Sustainalytics, Morningstar

Utilities

Powering the transition

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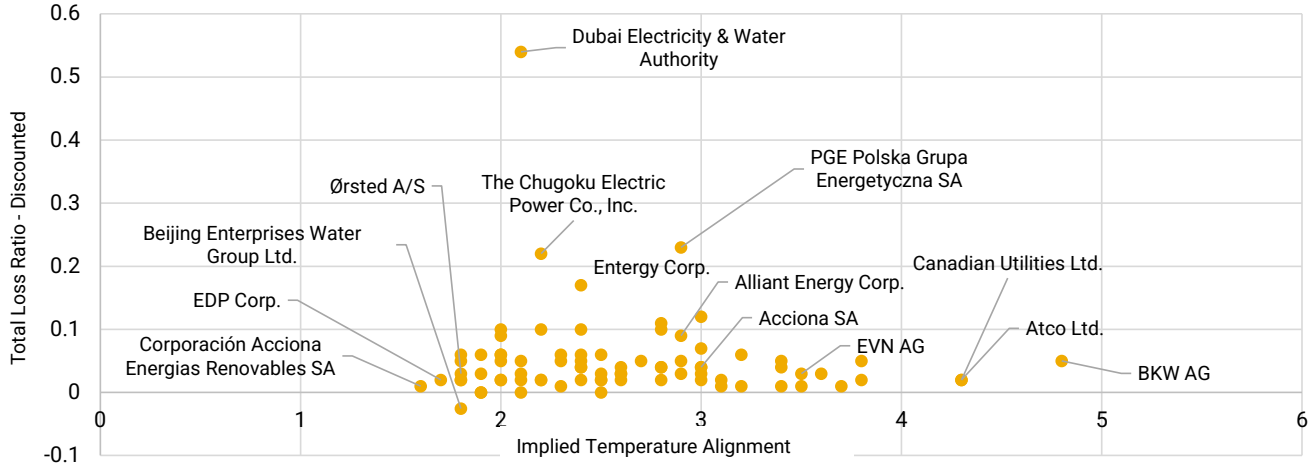
The Utilities sector has been at the forefront of the energy transition because this is the space where commercially viable alternative energy technologies have been available for decades. Several sustainability trends are on track to support growth in the sector. Broader electrification across the global economy is driving increased electricity demand, while grid improvements are supporting the demand for electricity. The sector's efforts towards a low-carbon economy include additional renewable power and energy storage deployment, increased grid reliability, capacity and flexibility. These initiatives are gaining momentum, with favorable climate related legislation in the US and other key markets. We expect the path towards decarbonization to continue through 2024 and beyond. A study by Deloitte projects that electricity prices will hold steady while sales increase by 2%.[59] In the EMEA region, Utilities continue to experience strong profitability, particularly in power generation, despite facing high capital expenditures and increasing debt costs. Grid operators are positioned for continued upside linked to inflation, despite their returns remaining modest. In 2024, these conditions set the groundwork for supporting solid cash flow from existing assets.[60]

Climate change poses risks to the sector, both in terms of physical events and regulatory changes. Heat waves and drought can disrupt companies' operations.[61] Regulations are also ramping up to curb emissions in major markets. In the US, the Electric Power industry represented approximately 33% of total US energy-related CO_2 emissions in 2022, primarily from coal and gas generation.[62] In the EU, the GHG intensity of power generation increased in 2022, with an average 6% emission growth compared to 2021. Despite strengthening climate mitigation and energy policies, the high price of natural gas and nuclear plant shutdowns resulted in a larger portion of coal use in the electricity generation mix.[63] To keep pace with their carbon commitments, policymakers will have to launch initiatives that enable energy savings and efficiency improvements, supporting the sector's renewable generation capacities by offering incentives and ensuring an effective use of electricity infrastructure.[64]

Exhibit 25 plots the performance of 79 utilities on two relevant data points. The TLR indicates the difference between the expected physical climate risk-related damages facing companies and their cash flow from now until 2050. On average, the TLR of companies in this sample is 0.05, indicating that their cumulative annual exposure to physical impacts would amount to about 5% of their cash flow by 2050. The average ITR of the sample is 2.5˚C, suggesting significant room for improvement. Corporacion Acciona Energias Renovables SA stands out as being more aligned to net zero (ITA=2.1˚C) and less exposed to physical climate risk (TLR=0.01) than most other firms in the sample.

Exhibit 25: Assessing Utilities on Physical Climate Risks and Net Zero Alignment



*N=79 Utilities firms listed on the Global Large-Mid Cap Equities Index
Source: Morningstar Sustainalytics

Corporacion Acciona Energias Renovables SA

A renewables pure play

Domicile: Spain
Industry: Utilities
Subindustry: Renewable Power Production
Ticker: MCE: ANE
Mkt cap: USD 6 bn*
*As of April 2024

Corporacion Acciona Energia Renovables is a renewables developer that was spun off from Spanish industrial conglomerate Acciona in July 2021. The floating share is 17.3%. In June 2022, the group had 9.2 gigawatts (GW) of consolidated capacity (11.2 GW of total capacity). Eighty percent of Acciona Energia's capacity is from onshore wind, nearly 10% is from hydro dams in Spain and 9% is from solar photovoltaic. Geographically, 50% of its capacity is located in Spain. The three biggest markets outside Spain are Mexico, the US and Australia, accounting for 12%, 11%, and 6% of capacity, respectively.

The firm targets 20 GW of total capacity in 2026-27, almost twice as much as in 2020, which looks, to us, to be within reach. The bulk of new capacity will be installed in the Americas and Australia. In terms of technology, the firm will focus on solar photovoltaic, in line with peers, which is expected to account for 52% of the company's new capacity. [65]

Acciona Energias' FY2022 energy mix was 74% from onshore wind, 16% from solar photovoltaic and 7% from hydropower. The company is involved in all project phases, from construction to plant operation and maintenance. Hydro and, increasingly, wind projects are often opposed by local communities due to potential relocations, land acquisition and real or perceived impacts on biodiversity, which can result in costly delays or even cancellation. Acciona Energias also faces risks related to employee, contractor and public safety, especially from the operation, construction and maintenance of wind, hydro and biomass power plants. Safety incidents can result in costly lawsuits, fines and operational disruption.

Acciona Energias' Audit and Sustainability Committee is responsible for environmental and social matters. The company's sustainability report was written in accordance with the GRI Standards, Comprehensive option, and was externally verified to a limited extent. Acciona Energias has implemented environmental as well as occupational health and safety management systems, externally certified to ISO 14001 and ISO 45001 standards, respectively, in line with best practice. Overall, the company is well prepared to manage physical climate risks. The firm recognizes the physical risks related to climate change and assigns managerial or board level responsibility for these risks. It integrates physical climate risks into its regular assessments and business strategy, provides detailed reporting on these risk drivers, and has initiatives to manage or adapt to them.

Although the company is leading the industry in developing renewable technologies, it is still moderately misaligned to a net-zero pathway, based on our model, because Utilities companies have complex supply chains that shift their transition related risks towards upstream activities. If all companies had the same investment alignment and transition preparedness, we estimate that the world would warm by 2.1˚C above pre-industrial levels. The company's exposure is moderately misaligned but its management of low carbon transition issues is strong and we expect that it will decrease its emissions by 33% compared to its baseline projection.

Exhibit 26: Key Data Points

Company	Corp Acciona Energias Renovables
ESG Risk Rating	9.3 (Negligible Risk)
Implied Temperature Rating	2.1
Low Carbon Transition Rating Category	Significantly Misaligned
Total Loss Ratio - Discounted	N/A
Total Loss Ratio - Text Level	N/A
Expected Revenue Loss Amount - Cumulative - Discounted	N/A
Morningstar Rating Overall	★★★★★
Moat	None
P/FV	0.6

*As of April 2024

Source: Sustainalytics, Morningstar

Telecommunications Services

Dialing in on energy intensity and materials extraction

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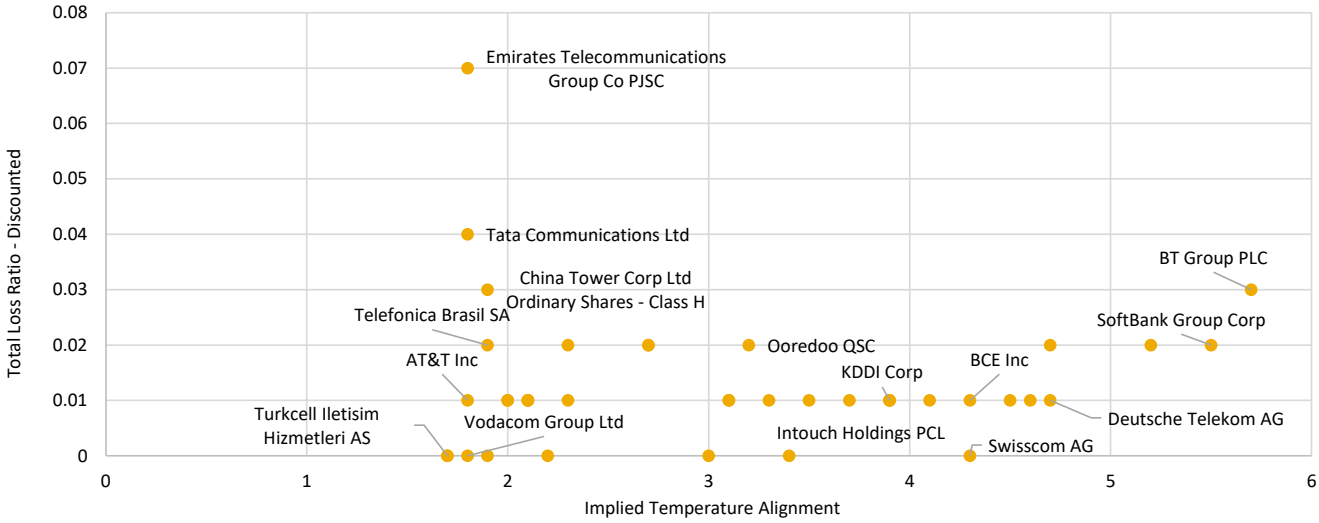
The Telecommunications Services sector has been embracing leading edge technologies that enhance their customer offerings and enterprise software sourcing.[66] While such advances can present upside for investors in this space, the sector also faces mounting sustainability risks. Among these risks are potential supply chain disruptions that could affect companies' ability to procure materials and technical components. Sourcing certain materials, including gallium, germanium and rare earth elements, presents a growing risk due to the environmental impact of producing them and potential supply shortages.

Climate risks include potential physical impacts on infrastructure and suppliers and the increasing price of carbon emissions in key markets. Telecom companies require a continuous power supply for cables, exchanges, switches, base stations, towers and data centers, as well as corporate offices and retail locations. As global customer demand for data and the Internet of Things (IoT), which will further increase the demand for data, continues to expand, network and data center energy usage is set to be the sector's largest energy expenditure.

According to a report by Deloitte, the Telcom sector only accounts for about 2% of global carbon emissions,[67] though with the expansion of data centers, the carbon footprint of companies in this space could rise significantly.[68] The report estimates that telecoms could reduce their carbon footprint by 2% globally as they transition from copper to fiber optic networks and replace 3G with more efficient 5G technology.[69]

Exhibit 27 plots two measures of climate change preparedness for 40 telecom companies. Emirates Telecommunications stands out with the highest total loss ratio, i.e. the most severe potential loss due to the physical impacts of climate change, driven largely by its assets in the UAE, which are exposed to coastal inundation. BT Group's severe misalignment to net zero is driven by the high level of emissions in its upstream supply chain and extremely small net zero budget due to historical emissions of the markets BT operates in (i.e. the UK).[70] With strong management to address climate risk exposure and higher budgets (due to lower historical emissions), South African firm Vodacom is more aligned to net zero than most other telecom companies.

Exhibit 27: Telecoms Face Physical Climate Impacts and Carbon Transition Risks



*N=40 Telecommunication Services firms listed on the Global Large-Mid Cap Equities Index. Select firms named; some dots overlap.
Source: Morningstar Sustainalytics

Vodacom Group Ltd

Expanding telecom networks in Africa

Domicile: South Africa
Industry: Semiconductors
Subindustry: Semiconductor Design and Manufacturing
Ticker: JSE:VOD
Mkt cap: USD 8 bn*
*As of April 2024

Vodacom Group Ltd is a telecommunications firm that provides fixed-line, broadband and mobile services. It earns revenue through two segments: South Africa and international, the latter of which covers African markets such as Tanzania, Democratic Republic of Congo, Mozambique, Lesotho and Egypt. Most of its revenue is from South Africa. Vodacom also has an enterprise service product, whereby telecommunications and managed services are offered to enterprises. The firm also owns mobile infrastructure.

In its 2023 integrated report, Vodacom notes several climate-related achievements. It states that a key area of focus is to decrease its scope 1 and 2 emissions. It also issued its first TCFD report last year. The firm reports that it has supported flood victims in South Africa, the DRC and Mozambique. The company has also established a new agreement with Egypt to gain access to renewable power, offsetting a large percentage of its fossil-fuel based electricity supply. In South Africa, the firm has co-developed a solution with the national energy provider, Eskom, allowing Vodacom to procure and wheel renewable power from utility-scale independent power producers.[71]

Telecoms companies recognize the rising emissions associated with next-generation network technologies and are implementing energy-efficient strategies to mitigate costs and prepare for future carbon regulations. These strategies include upgrading infrastructure, optimizing airflow, deploying efficient processors, sharing equipment, and integrating renewable energy sources. By doing so, they can reduce immediate energy expenses and safeguard against potential regulatory risks, positioning themselves for sustainable growth in the long term.

Vodacom is currently moderately misaligned to a net zero pathway. If all companies had the same investment alignment and transition preparedness as this company, we estimate that the world would warm by 1.7˚C above pre-industrial levels. While it is managing the issue better than many other peers, the firm is still misaligned: without any management or investment, we would expect the company to overshoot its emissions budget by 19,695,346 metric tons of CO_2e, or 172%. Still, the company's management of low carbon transition issues is relatively strong and we expect that it will decrease its emissions by 38.1% compared to its baseline projection.

Exhibit 28: Key Data Points

Company	Vodacom Group Ltd
ESG Risk Rating	13.2 (Low Risk)
Implied Temperature Rating	1.7
Low Carbon Transition Rating Category	Moderately Misaligned
Total Loss Ratio - Discounted	-
Total Loss Ratio - Text Level	Negligible
Expected Revenue Loss Amount - Cumulative - Discounted	38,748,044.0
Morningstar Rating Overall	N/A
Moat	-N/A
P/FV	-N/A

*As of April 2024

Source: Sustainalytics, Morningstar

Conclusion

This report provided an overview of how climate change and the transition to a low carbon economy can present material risks to public equities portfolios. Applying the Morningstar Sustainalytics LCTR and PCRM, we compared companies' preparedness to address climate related risks across 10 global sectors. Among the 3,373 companies listed in our sample that was drawn from the Morningstar Global Large-Mid Cap Equities Index, we found none to be Aligned to net zero, while only a quarter are moderately misaligned and three-quarters are significantly, highly or severely misaligned. This finding suggests that investors looking for broad global equities exposure may at best be able to develop a best-in class strategy that tilts their allocations towards moderately misaligned companies.

Our analysis identified 10 companies that we view as facing less low carbon transition risk than their sector peers, though we also note that even these firms have significant room for improvement. These companies are less misaligned to net zero than their peers due to a combination of their carbon management practices, the carbon intensity of their scope 1, 2 and 3 emissions and unique regional considerations. Overall, we observed a lack of company alignment with net zero and underreporting on carbon emissions, especially on scope 3. As we continue to improve our LCTR model to account for gaps in scope 3 reporting, many companies, including the ones highlighted in this report, will likely see changes to their LCTR assessments. We also found that physical climate risks vary widely, with most sectors facing losses averaging between 1% and 5% of their operating cash flow.

We highlighted several complementary data points, such as ESG Risk Ratings, indicators and fair value estimates, which we included in each company tear sheet as a reference point that investors can integrate into their equity market strategies. These and other fundamental factors are important to consider because climate change is just one among many broad trends that are affecting the prospects of public equities over the immediate to longer term. Other factors range from advances in technology to geopolitical tensions and election cycles.

Our survey of the market and focus on companies that serve as interesting case studies are initial steps towards developing a more comprehensive investment strategy. Investors can dig deeper into these examples when considering questions of best practices as well as the shortcomings in company reporting across each sector group.

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