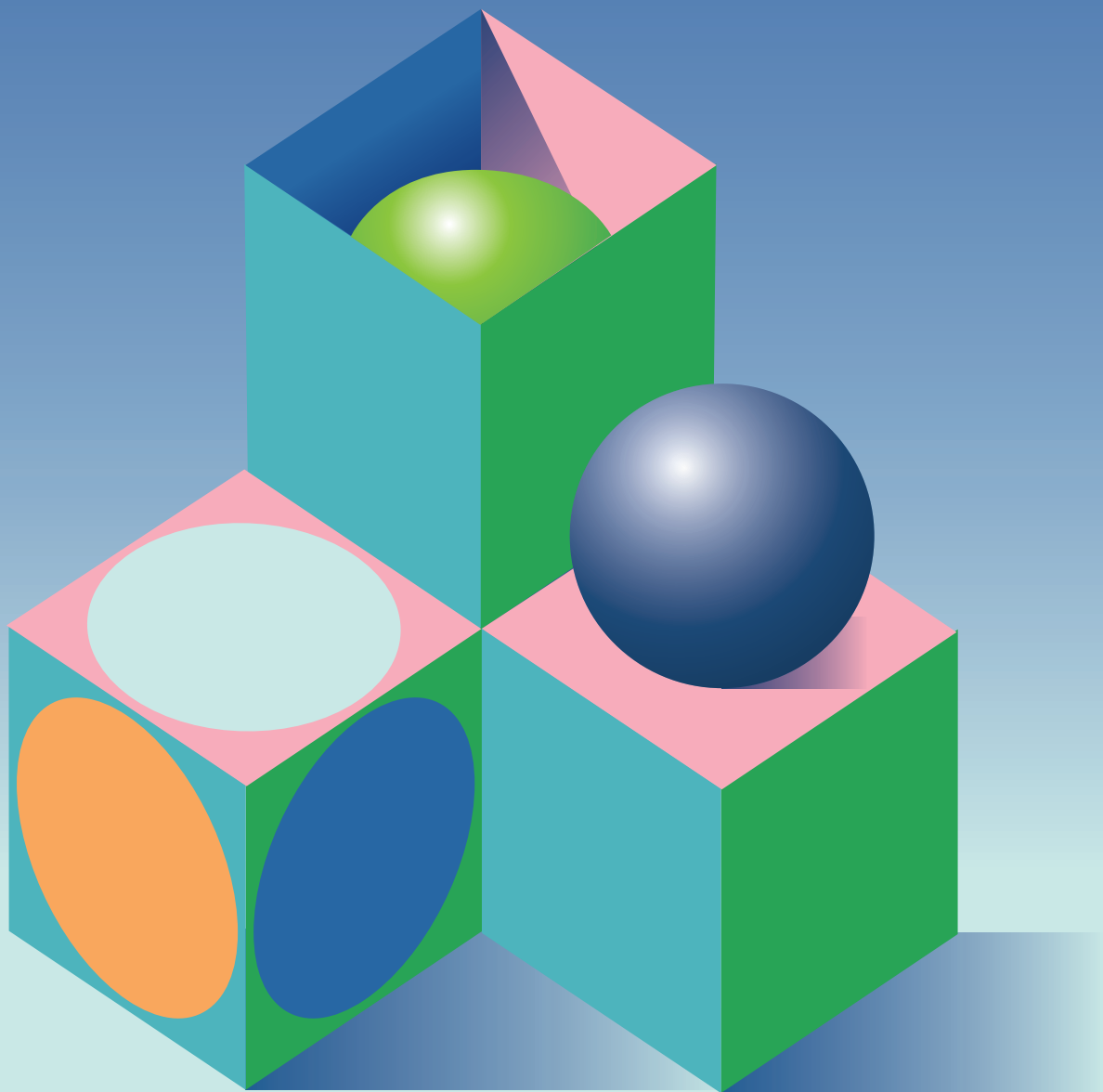


# COMPANIES AND CLIMATE CHANGE

A research application of the  
AIIB-Amundi Climate Change Investment Framework



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## List of abbreviations

**AIIB** – Asian Infrastructure Investment Bank  
**API** – Active Pharmaceutical Ingredients  
**BEV** – Battery electric vehicle  
**CCIF** – AIIB-Amundi Climate Change Investment Framework  
**CDP** – Carbon Disclosure Project  
**CLF** – Carbon Trust's Climate Leadership Framework  
**CT** – The Carbon Trust  
**DM** – Developed market  
**EM** – Emerging market  
**ERM** – Enterprise risk management  
**ESG** – Environmental, Social & Governance  
**ESS** – Energy Storage Systems  
**EV** – Electric vehicle  
**FTTx** – Fibre backbones and last-mile connections  
**GB** – Green bond  
**GDP** – Gross domestic product  
**GG** – Global Generics  
**GHG** – Greenhouse gas (emissions)  
**GPONs** – Gigabit passive optical networks  
**GSMA** – Global System for Mobile Communications Association  
**HEV** – Hybrid electric vehicle  
**ICE** – Internal combustion engine  
**ICP** – Internal carbon price  
**IEA** – International Energy Agency  
**IPCC** – International Panel on Climate Change  
**LNG** – Liquefied natural gas  
**NDC** – Nationally Determined Contribution  
**OEM** – Original equipment manufacturer  
**PPA** – Power purchase agreement  
**PSAI** – Pharmaceutical Services and Active Ingredients  
**PV** – (Solar) Photovoltaic  
**RCF** – Revolving Credit Facility  
**REC** – Renewable energy certificate  
**R&D** – Research & Development  
**SBT** – Science-based target  
**SBTi** – Science-Based Targets Initiative  
**SDG** – Sustainable Development Goal  
**SLB** – Sustainability-linked bond  
**SUV** – Sport utility vehicle  
**TCFD** – Taskforce on Climate-Related Financial Disclosures  
**TPI** – Transition Pathway Initiative  
**ULEV** – Ultra-low emissions vehicle  
**UNFCCC** – United Nations Framework Convention on Climate Change  
**UN** – United Nations

# Report Summary

## Context

The 2015 Paris Agreement represented a watershed moment in the global response to climate change. It required countries to commit to Nationally Determined Contributions (NDCs), outlining and regularly revising a strategy for how they will reduce greenhouse gas emissions, as well as adapt to the changing climate. Building on these commitments, companies and investors are beginning to mobilise to support the objectives of the Paris Agreement. Companies are figuring out how to transition their businesses towards a low carbon economy, as well as improving related reporting and disclosures. Conversely, investors are seeking to understand the environmental strategy and credentials of companies.

Comparison and benchmarking of companies is, however, difficult. The disclosure and quality of reported data on corporate climate targets, greenhouse gas emissions, transition strategies, and other environmental factors remains inconsistent, with large variations between countries and sectors. Policymakers and regulators across the world are also developing diverse frameworks for assessing climate risks, and investors have a vast range of methodologies and approaches available to them to identify opportunities. All of this can add to the existing complexity of financing the low carbon transition.

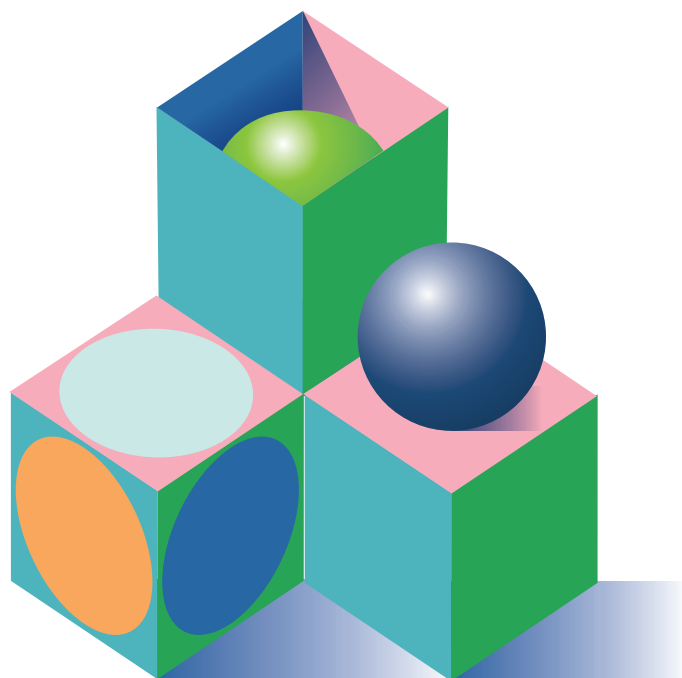
## The AIIB – Amundi Climate Change Investment Framework

Launched in [September 2020](#), The AIIB - Amundi Climate Change Investment Framework (CCIF) aims to provide investors with a benchmark tool for assessing an investment against climate change-related financial risks and opportunities. It translates the three objectives of the Paris Agreement into fundamental metrics that investors can use to assess an investment's level of progress towards achieving climate change mitigation, adaptation and resilience, and low-carbon transition objectives. For each objective, the CCIF sets out key metrics that can be used to assess financial risks and opportunities. The CCIF was jointly developed by AIIB and Amundi and was endorsed by the Climate Bonds Initiative.

## About this report

This report presents the research application of the Asian Infrastructure Investment Bank (AIIB) - Amundi Climate Change Investment Framework (CCIF). The CCIF aims to provide investors with a benchmark tool for assessing an investment, at the issuer-level, in relation to climate change-related financial risks and opportunities. The approach translates the three objectives of the Paris Agreement into fundamental metrics that investors can use to assess an investment's level of progress towards achieving climate change mitigation, adaptation, and low-carbon transition objectives.

This report presents the results of research conducted by three leading climate finance research organizations. Here, Fitch Solutions, The Carbon Trust and the Climate Bonds Initiative have applied the CCIF to sectors, companies, and debt issuers. The research universe comprised of companies domiciled in AIIB Members, predominantly in emerging market (EM) Asia, and operating within major infrastructure sectors including energy, water, sustainable cities, transport, and digital infrastructure. This report reviews the overall market and does not cover AIIB and/or Amundi-specific funds.



## Fitch Solutions

### **By sector: Data availability and quality gaps drive differences in performance**

This analysis compiled sector-level low carbon transition trackers, assessing and scoring the performance of 208 companies across eight sectors: automotive (auto), basic industries, energy, healthcare, technology & electronics, telecommunication (telecom), transportation (transport), and utilities. Key findings are outlined below.

#### **1. Using the CCIF shows high variation in how sectors align with the Paris Agreement objectives.**

**a. Climate change mitigation: Most sectors report on mitigation but inconsistencies abound.** Sectors are generally reporting carbon emissions and carbon reduction targets however the underlying data, methodology and scope is inconsistent.

**b. Climate Change Adaptation: Limited reporting on the physical risks related to climate change.** Sectors are limited in reporting their physical exposure to climate change. Alternative data sources and analyses, such as using country-level scores as a proxy, are sometimes required to assess sectors' efforts on adaptation.

**c. Financial contribution to transition: Varying performance by sectors.** Sectors with a higher correlation between direct carbon emissions and business models, for example energy, utilities, and autos, have more detailed policies and data related to financial contribution. Conversely, for sectors where emissions are indirect, policies and data related to financial contribution are less explicit.

**2. CCIF is a robust benchmarking tool, but financial capability should also be considered in assessing the companies' ability to transition.** Reducing carbon emissions, ensuring resilience, and investing in green technologies are all capital-intensive processes thus a company's green transition is partly contingent on its financial health. In acknowledgement of this, financial capability was added to the CCIF.

## The Carbon Trust

### **By company: Some progress, but work remains especially on climate adaptation**

This analysis compiled nine company case studies from the following sectors: autos, basic industries, energy, healthcare, technology & electronics, telecom, transportation, and utilities. These companies were among some of the more advanced organizations incorporating climate mitigation and adaptation strategies in their operations in Asia. The geographies covered include China, India, South Korea, and Singapore. Key findings are outlined below.

**1. Greater focus on renewable energy and GHG measurement.** Most of the companies adopted climate mitigation strategies by procuring renewable energy and measuring and reporting at least Scope 1 and Scope 2 greenhouse gas (GHG) emissions. Fewer companies had set 1.5-degree science-based targets and/or publicly committed to net zero goals.

**2. More efforts needed to devise and implement detailed adaptation measures.** Most of the companies conducted physical climate risk assessments. However, few companies incorporated financial analyses and implemented measures to respond to these risks. In addition, while many companies disclosed their climate mitigation plans, few companies focused on long-term climate adaptation plans.

**3. Growing investment into green technologies and integration of circular economy in operations:** Most companies focused on optimizing energy consumption across their products and services through investments in energy-efficient technologies. Continuous research and development initiatives for exploring green technologies, and life cycle assessments in most of the analysed companies were observed.

## Climate Bonds Initiative

### **By issuer: Companies contributing to the transition are not necessarily prepared for climate risks**

This analysis compiles 483 issuers and covered 33 geographies. Key findings are outlined below

**1. No companies performed well across all three CCIF objectives.** Even among green bond issuers, this analysis did not identify any issuers that did well on all three objectives of the CCIF: mitigation (target-setting and strategies), adaptation (low risk exposure and/or adaptation plans and strategies), and financial contribution (green revenues).

**2. Best performers were characterized by significant green revenues, and being located in low-risk areas.** These companies contribute a total of USD466bn of debt outstanding to the market as investment opportunities. However, due to the unpredictable nature of climate impacts, these companies may nonetheless be exposed to climate risks if they do not develop credible transition, adaptation, and resilience strategies.

**3. Most companies are subject to physical climate risks but are not taking actions to manage them.** Only 14% of companies researched have an adaptation and resilience plan in place, leaving the rest exposed to potential loss of financial value. This is particularly relevant for EM companies, as many of their domiciles already suffer disproportionately from the physical impacts of climate change. Further planning and implementation action is strongly recommended to manage climate risks.

## Conclusion

This report applies CCIF to analyse the climate performance of different sectors, companies, and debt issuers. The research found that while sectors and corporates are more climate-mitigation focused, more concentrated efforts are needed towards climate adaptation planning and implementation. For the sampled entities, operations across diverse geographical locations, climate mitigation and adaptation data inconsistencies, and company financial capability were among the challenging factors in performing well across all three CCIF objectives.

# 1. Introduction

## The Paris Agreement in action

The 2015 Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC) represented a watershed moment in the global response to climate change. At a national level, the Paris Agreement required countries to commit to Nationally Determined Contributions (NDCs), which outline how a country would reduce greenhouse gas emissions, as well as adapt to the changing climate. Every five years, countries are required to recommit their NDCs at a more progressive level. Building on country level commitments, companies and investors are starting to mobilise to support the objectives of the Paris Agreement.

### Driving company change: Regulations, investors and consumers

Regulatory changes, in part driven by the NDCs, are a major enabler of company and investor-level actions. For example, regulations to phase out internal combustion engine vehicles, to increase renewable energy generation, and to impose carbon taxes are having a notable impact on company investments and business models in sectors such as energy and transport. Other sectors have seen shifts around the edges, for example through their supply chain, end products, or underlying operational infrastructure.

Companies are also increasingly having to report on climate factors, including their greenhouse gas (GHG) emissions. In the EU, public companies with more than 500 employees must disclose information related to the social and environmental impacts of their operations. In Asia, jurisdictions are moving away from voluntary disclosures to a comply-or-explain or mandatory model. Singapore and Hong Kong, China have comply-or-explain policies in place, and in China, environmental disclosure requirements have been proposed.

On the investor side, there is a drive to align investments with climate change reduction efforts driven by disclosure regulations levied by market regulators as well as growing demand across institutional and retail clients. This has encouraged investors to develop frameworks to screen assets based on climate related factors (and more broadly social and governance through Environmental, Social and Governance (ESG) investing). In the future, a companies' access to finance may be more directly correlated with their environmental credentials. A current example of this is the lower yields on some green bonds.<sup>1</sup>

Finally, companies are under pressure from rising consumer awareness and concern over climate change, especially from younger demographics.

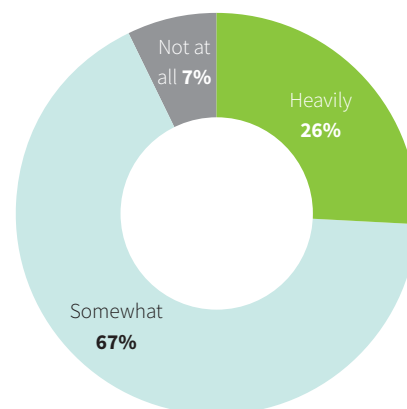
All of this is beginning to change company strategies, as shown for example in the results of the 8th Fitch Solutions Pulse Survey (published in May 2021 and including responses from 227 companies), where 66% of companies surveyed responded that they have a mandate to include ESG factors in their investment considerations.<sup>2</sup> Corporate green bond issuance has also grown to just over USD400bn over the 2014 - H12022 period.<sup>3</sup>

### Spotlight on regulations: The autos sector

The autos sector is an example of a direct business model shift. Governments in most of the major automotive markets are encouraging the adoption of electric vehicles (EVs) as part of decarbonisation goals through a mix of positive support such as purchase incentives, as well as restrictive policies such as longer-term bans on internal combustion engine vehicles.

In South Korea, for example, the government's 2020 'Green New Deal' set aside KRW73.4tn (USD60bn) of investment in 2020-2025 to fund purchase incentives for EVs and hydrogen fuel cell vehicles, as well as expanding charging

Figure 1. Responses to the question: 'Do you factor ESG considerations into your investment?'



Source: May 2021 edition of the Fitch Solutions Pulse Survey

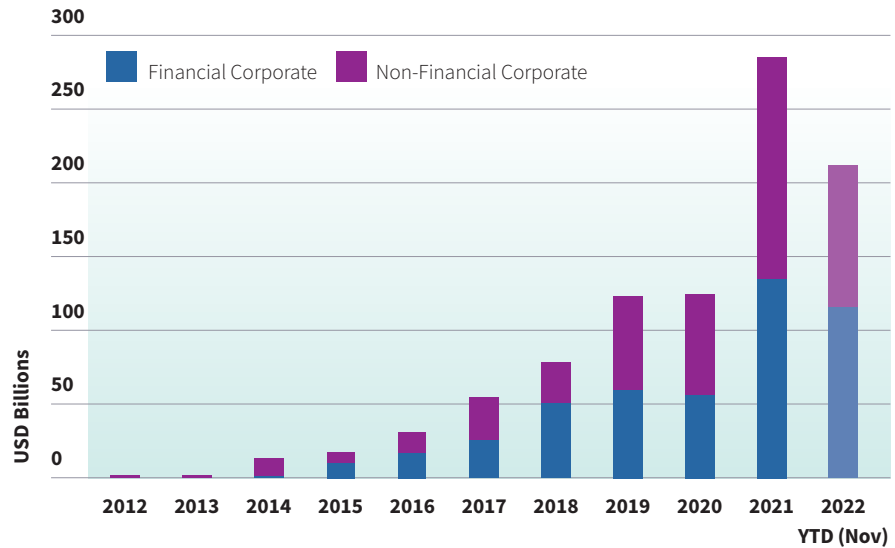
## The AIB-Amundi Climate Change Investment Framework

To meet client demand and contribute to the achievement of Paris targets, investors are increasingly seeking to understand, measure, and track company climate strategies. However, the extent of disclosure and quality of data reported vary between countries and sectors, making comparisons and benchmarking difficult for investors.

The AIB-Amundi Climate Change Investment Framework (CCIF) is an attempt to provide investors with the ability to screen investments based on climate aspects, and quantify and manage investment risk exposure to climate change. It adopts a holistic approach in line with the objectives of the Paris Agreement: Climate Change Mitigation, Climate Change Adaptation and Contribution to the Transition. For each objective, the CCIF sets out several metrics to quantify associated risks and opportunities.<sup>4</sup> The fundamental metrics are outlined in Table 1 on page 7.

The Framework is a knowledge product from AIB's Asia Climate Bond Portfolio project, whose objective is to select and invest in Climate Champions that will outperform in the long run. AIB's Asia Climate Bond Portfolio, which applies the Framework, will function as a live case-study for institutional investors.

Chart 1. Corporate green bond issuance over time



Source: Climate Bonds Initiative

### Sectors in focus for this report



**Energy:** Gas Distribution; Integrated Energy



**Automotive:** Auto parts & equipment; auto manufacturers\*



**Telecommunications:** Telecom-satellite; Telecom-wireless; Telecom-wireline integrated and services



**Basic Industries:** Building & Construction, Environmental Services\*\*



**Transport:** Rail; Transport Infrastructure Services; Trucking and delivery



**Technology & Electronics:** Electronics; Software & Services; Tech hardware and equipment



**Utilities:** Electric generation/distribution; electric-integrated; non-electric utilities



**Healthcare:** Health Facilities; Health Services; Medical Products; Pharmaceuticals

\*Only including autos companies with some element of electric or hybrid technology

\*\*Environmental services carried out by engineering and construction services firms

Table 1. Climate Change Investment Framework: Summary of investment metrics per Paris Agreement objectives

Paris Agreement Objective	Economic Risk / Opportunity	Investment Metric
Climate change mitigation	Transition risk	<p><b>Main Metrics:</b></p> <ul style="list-style-type: none"> <li>• <b>Risk exposure assessment metric:</b> What are the company's direct (Scope 1<sup>5</sup>) and indirect (Scope 2 &amp; 3<sup>6</sup>) carbon emissions?</li> <li>• <b>Risk management metric:</b> Is the company showing efforts aimed at reducing its Scope 1, 2 and 3 emissions?</li> </ul> <p><b>Key considerations:</b></p> <ul style="list-style-type: none"> <li>• Has the company set emission targets and/or have climate-related incentives for management?</li> <li>• Is the company pricing-in the cost of emissions in their current and future operations by using an appropriate shadow carbon price?</li> <li>• Are the company's current and future operations consistent with the pace recommended by climate change scientists to limit the impact of climate change in line with the Paris Agreement mitigation target to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels?</li> </ul> <p><small>Note: Mitigation efforts from issuers differ by sector and can be assessed per sector by methodologies such as the Science-Based Target Initiative. CBI's Climate Bonds Standard and the EU Taxonomy for Sustainable Activities (EU Taxonomy) also provide guidelines on the taxonomy of activities that can be considered as positively contributing to climate mitigation. Investors may use these guidelines as a starting point to quantify reductions in Scope 1 to 3 emissions.</small></p>
Climate change adaptation	Physical risk	<p><b>Main Metrics:</b></p> <ul style="list-style-type: none"> <li>• <b>Risk exposure assessment metric:</b> What proportion of the company's operations are located in geographies that have high climate change risk? What is the probability of occurrence of a climate hazard in the company's geography of domicile in the next years?</li> <li>• <b>Risk management metric:</b> Despite a certain level of exposure to physical risks, is the company taking steps to increase the resilience of its assets to climate change appropriately?</li> </ul> <p><b>Key considerations:</b></p> <ul style="list-style-type: none"> <li>• Does the company take physical or soft infrastructure (e.g. capacity building) steps to make its operations more resilient to the impacts of climate change?</li> <li>• How dependent is the company on raw materials which face a risk of shortages in the case of climate hazards?</li> <li>• What is the financial impact of climate-related disruptions to the company?</li> </ul> <p><small>Note: Quantifying the exposure of a company and the steps it has taken to adapt to the effects of climate change related physical risks varies largely by sector and location. Commodity-dependent companies are more vulnerable to climate-related disruptions on their supply chains. For example, a solar panel company can be exposed to physical risks through the scarcity of raw materials needed in their production process.</small></p>
Contribution to the transition	Low-carbon and climate resilient technologies/ activities	<p><b>Main Metrics:</b></p> <ul style="list-style-type: none"> <li>• <b>Risk exposure assessment metric:</b> What percentage of a company's revenue stream originates from products and services identified as climate change solutions ?</li> <li>• <b>Risk management metric:</b> Is the company taking steps to increase the proportion of its green revenue that corresponds to products and services designed for a low-carbon and climate resilient economy?</li> </ul> <p><b>Key considerations:</b></p> <ul style="list-style-type: none"> <li>• Is the company limiting its exposure to carbon-intensive activities and assets?</li> </ul> <p><small>Note: To date, there is no global consensus on technologies and activities needed to build a low-carbon, climate resilient economy. For example, some activities may not be considered as contributing activities even though they contribute to reducing carbon emissions (e.g. replacing coal power generation with less carbon-intensive fossil fuels like natural gas). Guidance from leading international bodies on climate change attempt to provide enough common features to trace vital technological developments. For example, the IPCC recognizes the development of renewable energy sources as a need for the transition of the energy sector. It also considers biofuels as a potential solution for the transition of the aviation industry. To this effect, the CBI Climate Bonds Standard and EU Taxonomy attempts to standardize technical criteria with a list of economic activities that are identified to make substantial contribution for climate change mitigation and adaptation. However, it is worth bearing in mind that some regional divergences exist, and some definitions of green may not be applicable to the current state of economies in developing countries. The forthcoming Taxonomy harmonization work by Chinese and EU regulators has the potential to set a globally recognized standard.</small></p>

Source: AIB / Amundi

## 2. Fitch Solutions: Sector trackers

Fitch Solutions' application of the CCIF focused on understanding the sector issues and variations in tracking companies based on the Paris Agreement objectives. This chapter highlights eight sector-specific trackers that consider and measure companies based on alignment with the three pillars of objectives of the Paris Agreement – mitigation, adaptation, and contribution – and explores the four highest scoring sectors in more detail. This exercise involved:

- Identifying key metrics to assess progress towards the Paris Agreement objectives;
- Understanding the availability and quality of data on a company and sectoral basis;
- Understanding variations in progress by sector;

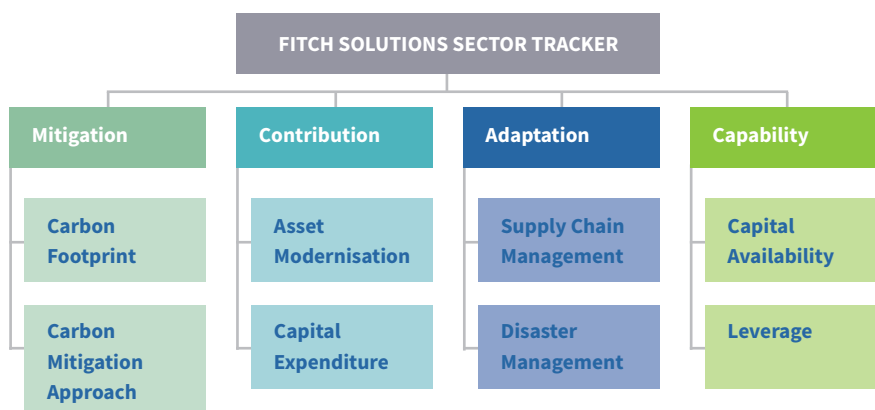
### Index generation and methodology

The three objectives of the Paris Agreement have been translated into company level metrics across eight sectors. While the CCIF is robust, in designing these sector trackers, Fitch Solutions added a fourth pillar to consider financial capability. This has been added as reducing carbon footprint, protecting against physical risk, and investing in green technologies are all capital-intensive processes and therefore any transition will be partly contingent on a company's financial health and capacity. Those companies in a more financially stable position, with access to capital, are better placed to set meaningful targets and fulfil them with actions.

It is important to note that any investment should be recouped in the longer term, as greater alignment with the Paris Agreement will create a more financially sustainable company, whose revenue streams are protected from climate risk and benefit from opportunities in a low carbon economy.

In accounting for the variations in business models, strategies and developments toward a low carbon economy on a sector-by-sector basis and as a result of the vast variations in

Figure 2: Fitch Solutions sector tracker structure



measuring climate change mitigation, adaptation and contribution, it was necessary to separate the eight indices into standalone assessments. This ensured they could be tailored to the most relevant measurements of alignment with the Paris Agreement.

Each of the Paris Agreement objectives were assessed within a measurable and quantifiable Index with indicators varying across the sectors assessed.

### Findings

#### Data availability and quality

There are a number of high-level conclusions on the availability and quality of the data available in order to track and measure companies based on the three objectives of the Paris Agreement.

**1. There is stark variation in how sectors and companies report data in alignment with the Paris Agreement objectives.** Whilst most companies report some level of data related to carbon emissions, carbon mitigation plans, green investments and other relevant factors, there is little consistency in the underlying data, thus making direct comparisons hard. This can be as simple as inconsistent units, or more complex based on underlying methodology and what level of carbon emissions are reported,

for example including only direct emissions (scope 1), or including varying levels of indirect emissions (scope 2 or 3).

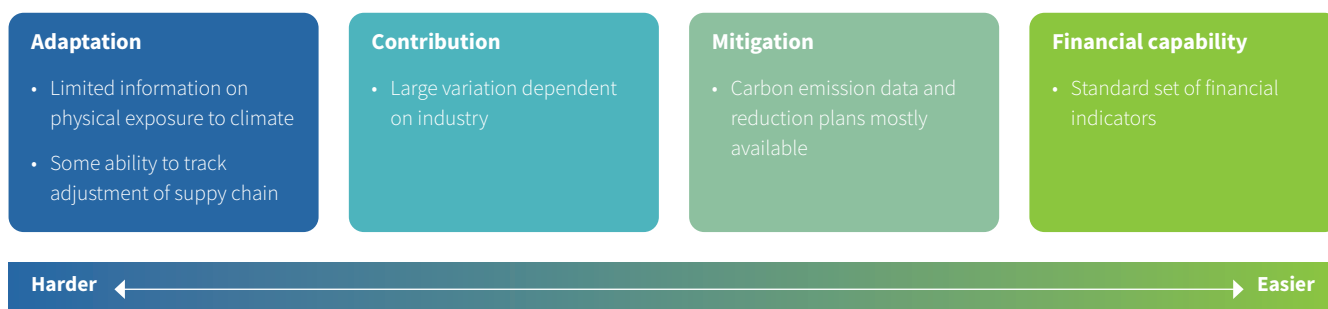
#### 2. Data availability varies significantly across the three objectives.

**a. Mitigation: Most companies report on Mitigation.** Companies are generally reporting carbon emissions, carbon reduction targets and are making clear their internal structures to meet these aims.

**b. Adaptation: There is limited quantifiable data on the physical risks around climate change, especially at company level.**

Companies are not forthcoming about their potential physical exposure to climate change, nor their efforts to mitigate this and it is hard to assess this risk at an asset level. In order to measure how companies are adjusting to the impact of climate change, much of Fitch Solutions' data collection focused on assessing how businesses are reducing their exposure to raw materials that will become scarcer as a result of climate change, such as water, and making their supply chains more resilient and less exposed to climate impacts. As a result of a lack of data, in many instances, country level scores have been used to represent company level exposure, as there is far greater data on country level exposure to climate risk.

Figure 3: Data quality and availability variations by index objective





**c. Contribution related data, including investment in low carbon technologies and revenue from green sources, is variable dependent on the sector.**

Those sectors with a higher correlation between direct carbon emissions and their business models, for example energy, utilities and autos, have clearer and more detailed policies and data related to diversifying and greening their strategies. Conversely for those sectors where emissions are more of an indirect element or form only part of the production process, the policies and strategies are more tenuous and less explicit. This will be explored further below.

**3. Companies in emerging and frontier markets disclose fewer data points on their transition to a low carbon economy, compared to companies in more developed markets.**

This is often correlated to the regulatory and reporting requirements within the country in which companies are based. Companies in some countries are required to disclose a high level of information, especially on mitigation related factors, whilst in many emerging and frontier markets, these regulations are not yet in place. Additionally, large international corporations are typically more exposed to reputational risks related to climate change, as well as facing greater exposure to international investors who are increasingly considering these factors in their investments – making voluntary reporting more likely.

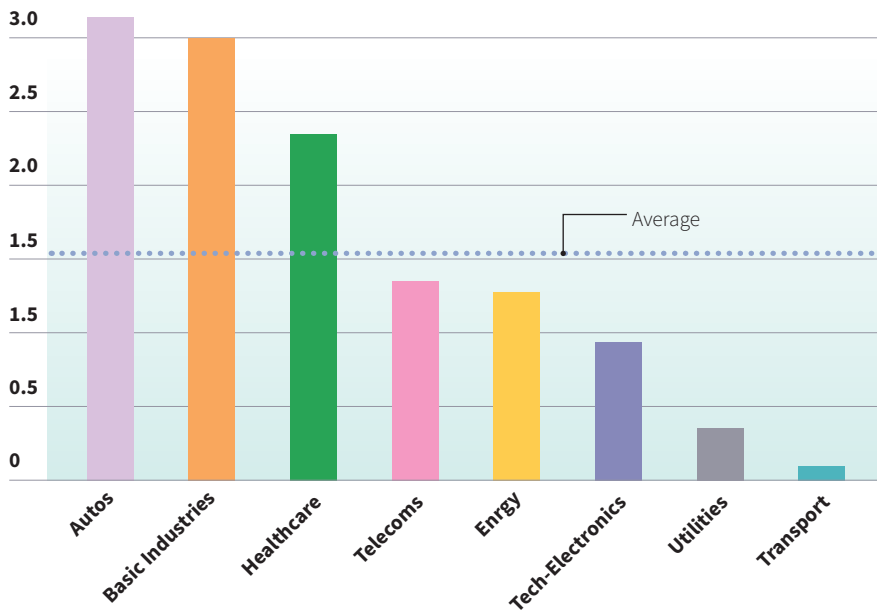
**4. Companies in traditional carbon intensive sectors have better data, and conversely sectors with less of a carbon footprint have less to say on their contribution to transition.**

Based on the conclusions of data collection and index building, companies need to improve the quality of their data reporting in order to illustrate the progress they are making toward the Paris Agreement objectives. In order to encourage this, regulatory directions need to be strengthened across all countries. Further, greater consistency in reporting standards and the type and format of data need to be introduced to enable better cross-comparison of companies and sectors. This will necessitate companies investing in better tools to track and report on emissions. Greater transparency and regulatory pressure will in turn support more ambitious policies in order to meet the objectives of the Paris Agreement, as well as place greater accountability on companies in ensuring progress is made on these targets.

**Sector performance analysis**

When assessing the data of the eight sector trackers, several trends emerge on variations in sector performance.

Chart 2. Average data gaps by sector



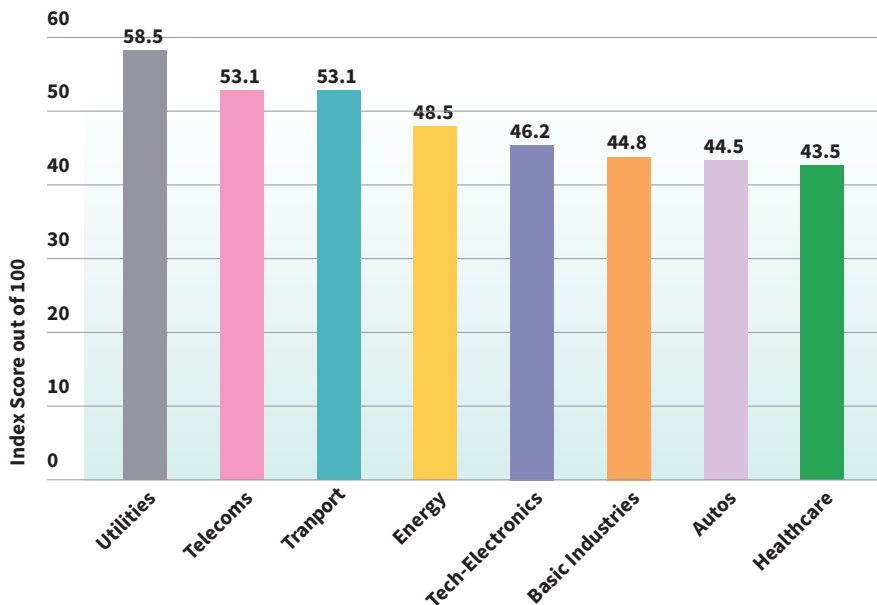
**Data availability**

In total Fitch Solutions assessed the performance of 208 companies across eight sectors. Data availability is highly correlated to overall sector performance, as in these indices companies are penalised for not having data available on their low carbon transition efforts. This is important as transparency and therefore the ability to track companies on the pillars of the Paris Agreement is a fundamental part of what is being measured. It is notable that utilities and transport score very well in terms of data availability. As chart 2 above shows, companies in these sectors tend to report the most data relevant to mitigation, adaptation, and contribution and certainly there are fewer data gaps, as compared to autos, basic industries and healthcare companies – all of which have far greater data gaps than average.

**Which sectors perform best?**

Owing to the structure of the indices, with each tailored to the specific metrics and dynamics of individual sectors, there is limited scope to highlight an overall winning industry in terms of transition towards a low carbon business model. Some sectors are further along their transition journey (e.g. utilities); this is largely down to the fact that this is an industry which needed to shift from a business model dependent on fossil fuels. In the case of many of the other sectors, there has been far less of a journey to make. A further complicating factor in assessing the different sectors in terms of their performance is the vast variation in data quality. Telecom companies, for example, tend to produce much more data than autos companies and therefore appear to have transitioned further. However, as a sector, Autos

Chart 3. Average index score by sector



is contributing heavily to the transition through electric and alternative fuel vehicles, whereas the advancements in the telecom industry are less substantial in terms of overall business models.

Taking the scores across all companies measured for each industry, the utilities sector, on average, has the highest overall index score, at 58.5 out of 100. This indicates that utilities companies are better at reporting data and are more likely to be tracking their transition to a low carbon economy.

The utilities sector tends to report data better than many other sectors, across all pillars of the index, most notably in terms of their level of renewables investment (contribution) and the actual penetration of renewable electricity into the overall power asset portfolio (mitigation). The utilities sector has the most advanced low carbon technologies of any sector, with renewable electricity generation an established part of power generation portfolios. The sector has also initiated many incentives to expand investment into these assets such as feed in tariffs and tax incentives, and now in many cases has cost parity with carbon intensive technologies, enabling this sector to move ahead in its low carbon transition. Furthermore, due to the intrinsic nature of carbon emissions in the utilities sector, the availability of data is high, enabling better scores.

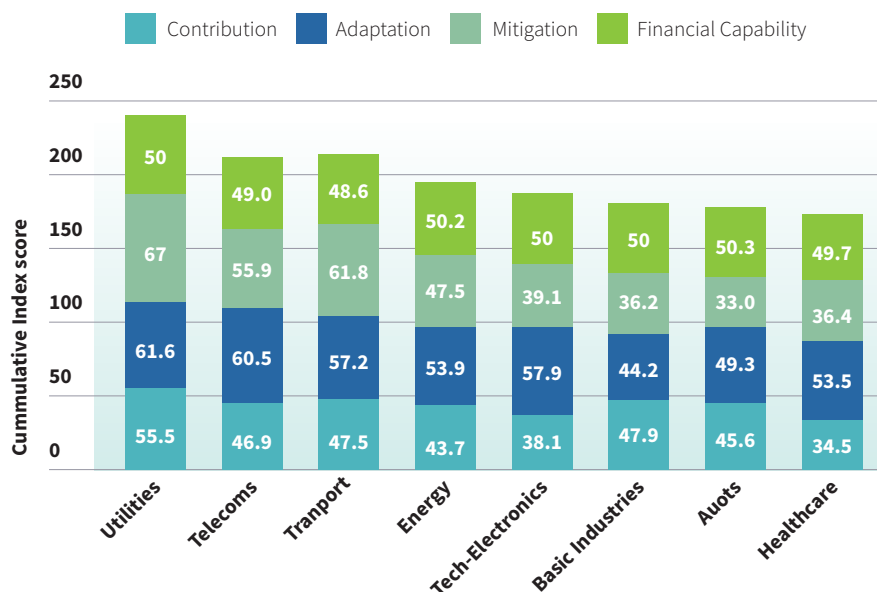
Transport and telecom are two other sectors of note, both scoring above 50 on average for transition. The transport sector's performance is strongly tied to high data availability – it has the most data available of any sector – as well as strong scores across categories. Part of the explanation for this is the size of the companies measured within this sector – many are large industry stalwarts. Global brand names tend to be more likely to fall under investor spotlight to report on carbon mitigation efforts, given the extent of direct emissions from the transport sector.

A similar story emerges in the telecom sector with major national incumbents making up the majority of companies measured in the index. Whilst the telecom sector has much larger variation in scores with companies from developed markets scoring much higher than emerging market telecom providers, the availability of data remains strong and thus boosts the overall sector average.

The technology & electronics sector scores are reasonable. Indeed, the overall data availability is relatively strong compared to other industries and the sector scores especially well for its adaptation, owing to a shift in the use of raw materials exposed to climate change.

Of the eight sectors, healthcare companies score on average the worst, which is due to a lack of data availability to measure carbon transition performance and the challenge faced within this sector in identifying metrics required to meet

Chart 4. Sector performance by index pillar



the contribution pillar, given the limited direct carbon emissions generated by this sector. The better performing companies in the sector tend to be located in developed markets, where reporting standards are higher and therefore data availability is stronger.

An important part of the scoring for all the indices is around data availability with companies penalised for a lack of data: it is this that has impacted the scoring for the healthcare industry with companies unable to record on average 2.3 indicators (compared to an average of 0.3 indicators in the utilities sector). Furthermore, healthcare is a sector where carbon emissions are more indirect, or form only part of the production process, and so the policies and strategies restricting carbon emissions tend to be more tenuous and less explicit. The lack of data is especially apparent when companies report around contribution, compared to mitigation and adaptation. In collecting data on how healthcare companies are making contributions to the transition to a low carbon world, it is notable that some are at least trying to make their production processes greener and to reduce waste and this comes through in relatively strong scores for adaptation versus other pillars of the index.

The basic industries sector also suffers from poor quality data, with the second highest number of data gaps of all industries. This is most notable in the mitigation pillar, with many companies failing to report data on energy consumption, waste management or overall emissions. As such, it is not possible to illustrate any progress in the transition for many companies assessed and the sector scores especially poorly for this pillar as a result.

The other industry notable in having a low Transition score is Autos. This result is a little surprising given the clear contribution the industry is making to carbon reduction through

the development of electric and alternative fuel vehicles. However, rather like healthcare, the biggest reason for the sector's underperformance is down to the high level of data gaps in company reporting; indeed, the autos sector has the highest number of gaps (on average each autos company measured has 3.2 indicators not reported). Additionally, we observe the largest spread of transition scores across companies in the autos sector, with a large gap between the strongest performers, who are scoring well across many elements of the index, and the weakest performers who have poor scores and data gaps. Notably, those top scorers are primarily large automakers, whilst those at the bottom tend to be manufacturers of commercial vehicles or those companies focused on electric vehicles or its component parts. These companies may be contributing to transition but the data reporting amongst this last category of companies is particularly poor. As such, autos companies should focus on improving their poor and inconsistent reporting standards.

## Sector deep dives

This section focuses on the four industries that score highest in the Sector Index, namely utilities, telecom, transport, and energy.

There is little doubt that power utilities stand to gain from the energy transition outlined under the Paris Agreement, and several of the world's largest power companies are well on the way towards carbon neutrality. However, there is still much to do: in order to transition to a low-carbon business model, utilities will still need to invest in greater renewable capacities, phase out coal-fired power and upgrade levels of power efficiency.

There is less at play for telecom companies and indeed, those companies performing best in making a transition to low-carbon business models appear to be doing so as a response to a range of external stakeholders, be they shareholders, customers or governments, rather than addressing the issue of climate change as a specific operational challenge.

Rather like the utilities sector, companies operating in the transport industry realise there are a number of business opportunities as a result of climate challenge concerns.

These include investing in technologies that employ greener fuels, investing in supporting infrastructure to accommodate greener fuel use and increasing the use of rail, inland waterways and cleaner maritime transport to benefit from cleaner, readily available freight options.

Energy companies have perhaps the biggest incentive to align themselves with the Paris Agreement. Doing so pre-empts tighter regulations and bolsters public perception. Mitigation also benefits companies in terms of delivering greater efficiencies, lower energy use and input costs, thereby cutting expenditure and increasing revenues. Indeed, the best-performing energy companies tended to have the most developed climate change mitigation strategies, attempting to tilt their business away from core oil and gas activities into clean energy products and services.

These four sectors are examined in the next section.

## Utilities

### Utilities Index

Using the CCIF, the Utilities Index seeks to capture the extent to which this sector's companies' operations, investments and strategies fall in line with the Paris Agreement goals of mitigation, adaptation, and contribution to the transition. A fourth vertical – Financial Capability – was also added to the CCIF to assess a company's financial strength and ability to deliver on its climate objectives.

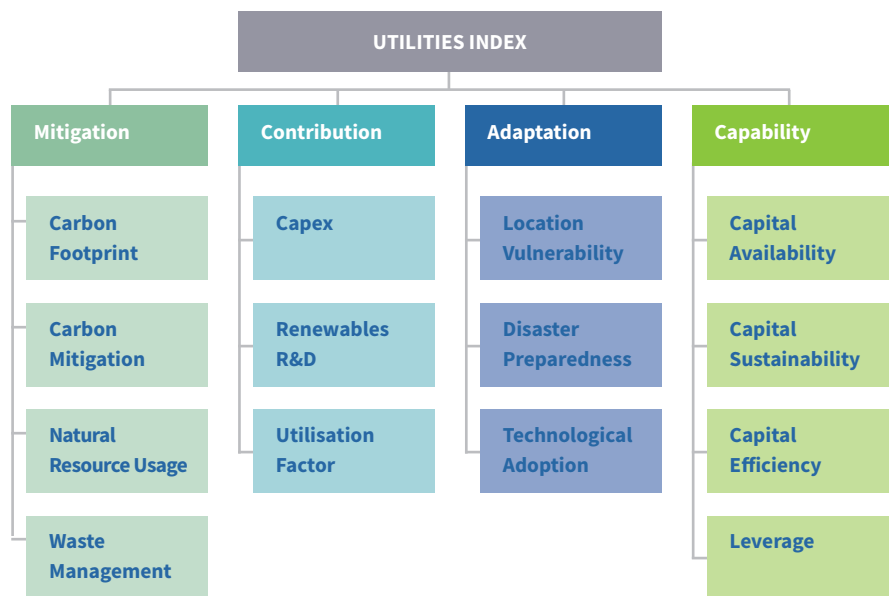


### Mitigation

Comprising four segments, the first is based on the utility's carbon footprint. Here, the Index assesses each utility's percentage change in emissions between 2016 and its most recent levels (2020/2021), and gives a ranked score relative to the other utilities in the index. This score is combined with a carbon intensity score, which measures the total emissions per unit of generation for power generators or per unit of total sales for power transmission utilities. These two data points are combined and weighted equally to give an average.

The three other segments are all qualitative. By researching and analysing each utility's annual reports, sustainability reports, websites and other official documentation, scores are given for Carbon Mitigation, Natural Resource Usage and Waste Management. Scoring considered aspects such as the presence of dedicated committees, budgetary allocations, internal policy formation, resource consumption, waste creation, recycling, mitigation commitments and plans in place to achieve these targets.

Figure 4: Utilities Index composition



### Contribution

Capex forms the base of this pillar as it is an indication of the overall investment undertaken by the utility over the most recent reporting year. The Utilisation factor score denotes a ranking of the overall generating efficiency of a utility's power plants, and is calculated by dividing total power generated in 2020 by the total operation capacity owned by the utility. Finally, the Renewables R&D score is a qualitative score derived by the analysis of each utility's efforts in designing and deploying new renewable power technologies to determine the utility's contribution towards innovation and improvement in the industry.

### Adaptation

This score for Adaptation takes three variables into account. Location Vulnerability is a function of the utility's exposure to climate change risks based on its operating location. Here, large multinational corporations achieve strong scores, as their geographical dispersion mitigates the risk of localised changes in the climate impacting negatively on their operations. This score is particularly pertinent for utilities maintaining a heavy hydroelectric asset base due to its vulnerability to drought. Similarly, Disaster Preparedness scores utilities based on their location, and denotes the level of preparation for natural disasters in each market. The last of these three segments refers specifically to the level of uptake in new, clean and efficient technologies in each utility's businesses, and is scored qualitatively. By adopting these technologies, utilities are seen to be better prepared to undertake the energy transition and be more resilient to the challenges faced in doing so.

### Context: Transition to sustainability and carbon neutrality

The global initiative to reduce carbon emissions has been one of the most prominent driving forces behind major changes in the power utilities sector over recent years. Signatories to the Paris Agreement have been at the centre of efforts to transition their power sectors towards sustainability and eventual carbon-neutrality by 2050. While severely eroding profitability for conventional thermal power producers, this systemic shift has also cultivated some of its most attractive investment opportunities with particular focus on renewable generation types.

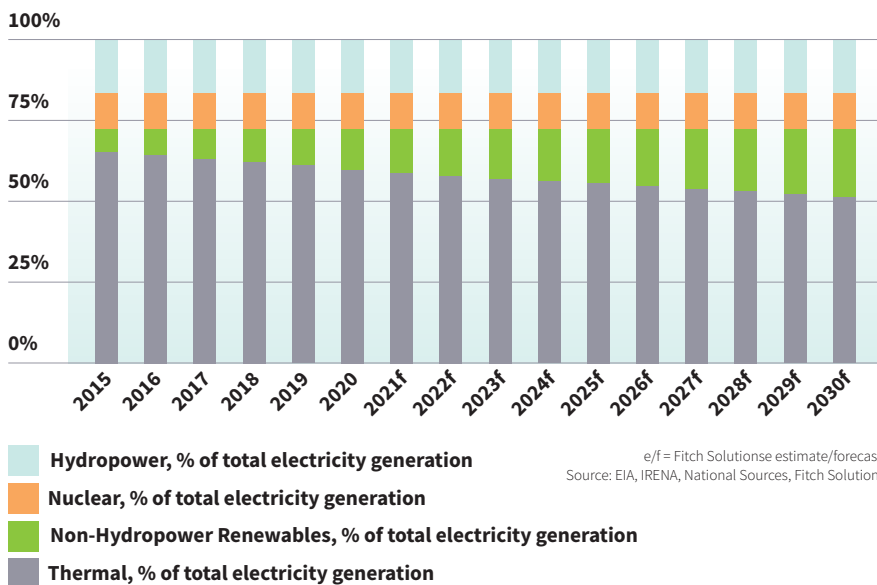
Sharp declines in the cost of solar and wind power equipment have greatly reduced the initial capital expenditure required to construct large-scale power plants. With numerous governments offering preferential tax incentives, a variety of subsidy structures and renewables-specific pricing regimes, margins on such power plants have grown to compete broadly with conventional generation types. Added to that, the uptake in renewables has also increased the diversity of many utilities' generation portfolios, making them less vulnerable to feedstock market fluctuations, climate change and overall improving the resilience of their businesses.

### Coal-fired power facing sustained downward pressure

The Paris Agreement establishes a number of binding commitments for its signatories, which included 174 states as well as the European Union. With significant carbon emissions emanating from the burning of fossil fuels, the power sector has been a focal point of reforms that states have deemed necessary to meet their commitments. As a result, there have been vast changes in investment patterns across the sector, with a rapid uptake in low- and zero-carbon generation types.

Power utilities have been heavily engaged in the sustainable energy transition brought on by the Paris Agreement, with the primary focus being to reduce Scope 1 emissions (direct emissions from the business, such as power generation). As a result, the conventional thermal power sector has been at the centre of government intervention aimed at disincentivising further investment, with a particular focus on coal-fired power. The retraction of subsidies, introduction of punitive tax measures and instalment of policies preventing new investment in coal-fired power have been widespread, most prominently among EU member states. Indeed, since the Paris Agreement's signing in 2015, the overall share of coal-fired power in the global power mix dropped from 38.9% of total generation to an estimated 35.0% by the end of 2020, representing an 86TWh decline in total coal-fired power.

Chart 5. Global share of total power generation by type, 2015 – 2030



### Steam integration props up gas fired profits while reducing emissions

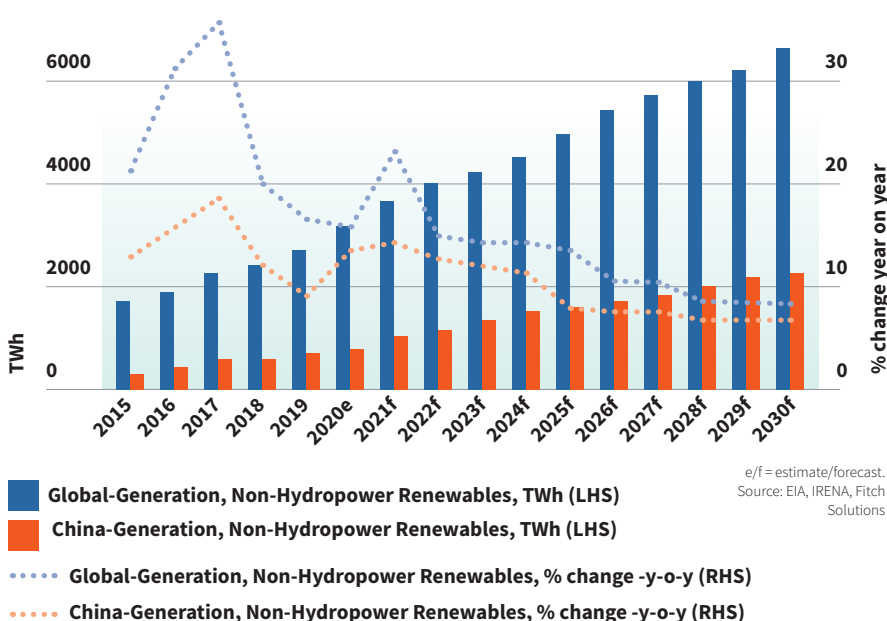
While coal power has been the core focus of many markets' carbon reduction efforts, gas-fired power has offered an attractive alternative form of baseload thermal generation, seeing net growth amounting to more than 750TWh between 2015 and 2020. By integrating steam generation into gas power plants, utilities are able to significantly improve the efficiency of their existing simple-cycle gas turbines. This, in conjunction with back-end mechanical and chemical filtration, can markedly improve the technology's emissions relative to overall power production. As a result, there has been strong investor interest in combined-cycle gas power generation, especially in markets traditionally

reliant on conventional thermal power. While this has presented notable potential opportunities, investment has largely been concentrated among utilities either already operating a portfolio of gas-fired power plants seeking to offset carbon tax expenditure by increasing production, or to offset declining coal power production.

### Renewables present most attractive investment opportunities

Despite gains being made in the gas-fired power segment, the Paris Agreement has driven the vast majority of investment outside of conventional thermal power. With binding agreements in place, numerous governments have instituted policies aimed at attracting investment into renewables, with a particular focus on solar

Chart 6. Global and China – Hydropower and non-hydropower renewables generation, TWh



and wind power. Many utilities investing in renewables benefit from tax incentives, government subsidies and/or balanced pricing regimes specifically offered to renewable power projects. These incentives and support structures are particularly strong among EU member states, with robust green financing mechanisms also offered to renewables investors in the region. These markets, along with other developed economies such as Canada, have fostered policy structures conducive to renewables investment, boosting the share of emissions-free generation in their overall power mixes.

Major financiers in the Asian market have also announced plans to boost support for renewables investments across the region, which holds some of the world's highest wind, solar and geothermal power potentials. Despite the fact that policy support structures in Asian countries are not typically as robust as their Western European counterparts, their vast power potential and rapid power consumption growth have nonetheless made the region an attractive destination for renewables investment. China represents by far the largest power market in the region and, despite its ongoing investment into new conventional thermal power capacity, it stands out as the world's leading market for renewables investment. China alone has increased its non-hydropower renewables generation by nearly 570TWh between 2015 and 2020, with further growth forecast at more than 1,430TWh between 2021 and 2030.

Even in developing economies, utilities stand to gain significantly from the low-carbon transition being driven by the overarching commitments made under the Paris Agreement. Unlike many developed markets, most developing economies have not yet adopted comprehensive policy reforms and subsidy structures for non-hydropower renewables investment. However, the energy transition can have long-term benefits for utilities in these regions even without such incentives. Markets such as those in the Middle East, North Africa and Sub-Saharan Africa tend to rely heavily on single generation types, be it thermal or hydroelectric. By investing in non-hydro renewables, utilities in these markets would make significant strides in diversifying their generation portfolio, thereby improving the business' resilience against drought and feedstock price fluctuations. At the same time, these utilities would also have access to dedicated green financing options even in higher-risk markets where conventional international financiers would not likely be willing to invest.

### **Challenges: Slow renewables growth, especially in developing economies**

However, despite the opportunities derived from the low-carbon transition, utilities will be faced with a number of challenges in achieving the goals set out by the Paris Agreement. Many

utilities still rely heavily on conventional thermal power, and will face the significant cost of retiring these assets while simultaneously investing in new renewable power plants. Given the frequently decentralised nature of renewable power plants, transmission and distribution utilities will need to invest heavily on building out their grid systems to access areas with the highest natural potential for renewable generation types. Further investment will also be needed to modernise transmission infrastructure and install grid-stabilization storage in order to avoid the vast fluctuations in supply coming from intermittent solar and wind power. Those utilities that are dominant in their markets will incur a heavier burden to carry out these reforms alone, as decarbonising the state's power sector will fall primarily on their business alone.

Larger multinational utilities will see greater administrative loads as markets institute more detailed and stringent standards for emissions reporting and operational data collection, while simultaneously initiating and overseeing the progressive mitigation of waste and non-core (Scope 2 and 3) emissions.

### **Conclusion: Transition needs to offer economic and operational opportunities**

The energy transition outlined under the Paris Agreement continues to drive significant changes in the power sector. With many of its signatory states putting in place measures to support the transition, power utilities stand to gain both economically and operationally from the changing market environment despite the challenges it presents.

A number of the world's largest power utilities are already well on the way towards carbon neutrality and fostering sustainability. By putting in place such plans, utilities can make informed investment decisions which both grow the business and reduce its overall emissions. Data tracking forms an essential part of a utility's ability to accurately forecast the impacts of particular investment strategies and internal policies, and consistent oversight is necessary to ensure that these plans can be executed in a financially sustainable manner.

Information pertaining to government policy formation plays a major role in all aspects of the transition, and can make some technology types considerably more attractive to investors than others. In markets with high carbon tariffs in place and where strong renewables incentives are offered, investment in solar and wind power may offset the long-term cost of retiring thermal power plants. Utilities with strong low-emissions baseload capacity such as nuclear power in their portfolio are at an advantage, as these utilities may be better equipped to power down large coal and oil power plants without risking the reliability of their power output or jeopardising their revenues. The same can be said for

those investing in large-scale power storage infrastructure such as pumped hydropower plants or battery storage facilities. In markets with high solar power potential, utilities which maintain high levels of coal-fired power in their portfolios may benefit from investment in solar thermal power plants with associated short-to-medium duration storage as an interim step in securing the reliability of their electricity supplies while building out their renewables base. On the other hand, utilities that have already heavily invested in intermittent renewables may benefit more from investments in long-duration electricity storage (capable of 10 or more hours of supply at peak rated output) infrastructure to better stabilise sales during hours of peak demand low generation. Overall, by undertaking well-planned investment strategies with ambitious long-term goals and regular interim targets, many of the world's most successful utilities have been able to ensure solid business gains while still leading the way towards the energy transition in the sector, something which will make these utilities far less vulnerable to the challenges to be faced by those utilities which are slow to take up the transition.

Finally, it is observed that many of the world's leading power utilities emphasize transparency in their business operations, plans and performance. Under Article 13 of the Paris Agreement, developed countries are required to report information on the financial, capacity-building and technological transfer support offered to developing countries, and developing countries should provide information on the support they need for each of these aspects. Being a core component of a country's economy, information from power utilities is crucial in ensuring proper reporting. While utilities from developed economies such as those in the EU generally maintain very strong and easily accessible reporting practices, many of those in developing countries still leave significant room for improvement.

Overall, our index highlights one significant lesson for utilities across all the Paris Agreement's signatories. The energy transition in the power sector presents both significant opportunities and challenges to utilities, and the best way to capitalise on those opportunities and mitigate the risks presented by those challenges is to begin improving upon key aspects such as emissions and investment in renewables as early as possible, which allows for a slower and more controlled transition. In order to transition successfully to a low-carbon business model, utilities need to act by

- building out renewable power capacities;
- phasing out coal-fired power; and
- investing in power efficiency upgrades

## Telecommunications

### Telecommunications Index



Using the CCIF, the Telecommunications Index seeks to capture the extent to which this sector's companies' operations, investments and strategies fall in line with the Paris Agreement goals of mitigation, adaptation, and contribution to the transition. A fourth vertical – financial capability – was also added to the CCIF to assess a company's financial strength and ability to deliver on its climate objectives.

#### Mitigation

Although the telecom sector has, for many years, been reporting on its environmental and societal impacts, few standardised KPIs have yet been devised to quantify these impacts and this means that it is difficult to compare each entity's reported KPIs on a like-for-like basis. The Index therefore uses a mix of industry-standard KPIs that have some direct bearing on environmental impact as well as subjective assessments of what entities say and are seen to be doing.

Mitigation is the best reported part of the Index scores as these efforts resonate best with the largest pool of stakeholders within the industry's ecosystem: consumers, shareholders, employees and governments. Data purporting to show progressive reductions in carbon emissions and more efficient usage of energy have an easily-appreciated visual impact, even though the methodologies behind these indicators are not always water-tight. For example, apparent falling carbon emission data may be leveraging carbon offsets that do not show how overall carbon emissions might be rising when taking into account contributions through third-party assets such as data centres and rivals' infrastructure.

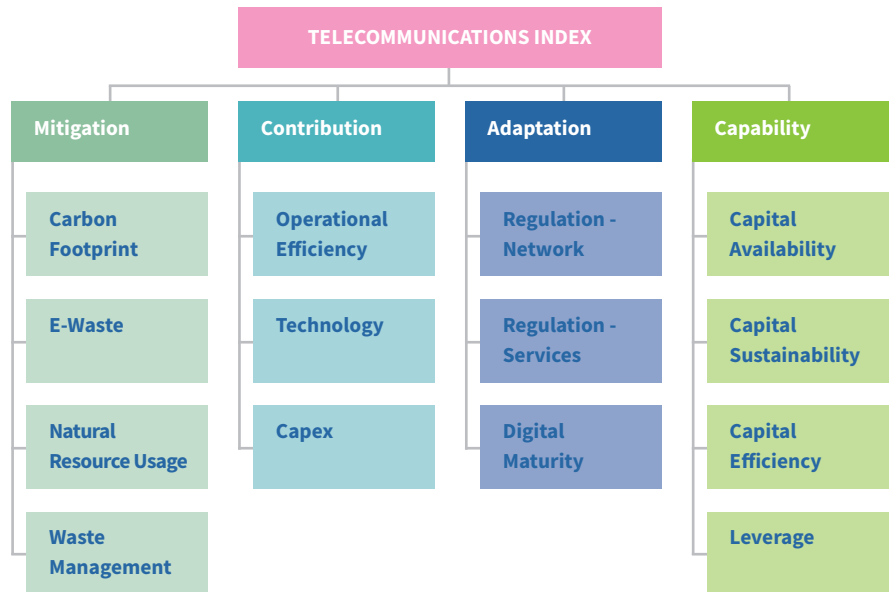
#### Contribution

In common with the findings from the other sectors surveyed in this section, it proved difficult to assess contribution to the transition process on a purely quantitative basis. A lack of meaningful and standardised data is the main barrier to fully understanding how this objective is being addressed. In the Telecommunications Index, only three aspects of companies' low-carbon transition contribution efforts are trackable, and we have used a number of operational and financial indicators as proxies.

The Index considers how revenues and capital expenditure per user are improving (or not) for each company; this suggests that improving metrics reflect enhanced operational efficiencies and growing revenues.

Increasing revenues feed into capital availability for companies, giving them more resources to invest in newer and more energy efficient technologies (e.g. electrification of fleets, use of

Figure 5. Telecommunications Index composition



artificial intelligence in customer servicing, use of drones in infrastructure maintenance) as well as undertaking more capital-intensive activities such as consolidating their asset bases, streamlining back-office functions and rationalising resources such as office space and manpower.

#### Adaptation

Assessing companies' Adaptation potential is also challenging, given that almost no telcos actively track this in a meaningful way, even though many do report on projects carried out internally or with third parties to help communities and society at large leverage their digital connectivity and services to adapt to a changing environment.

For this aspect of the Index, the focus was on industry-specific regulatory requirements on networks and services, as well as the maturity of the digital market in which each telco operates. Through regulations, governments are able to mandate the advancement of more efficient infrastructures and systems, requiring the replacement of legacy physical-based systems with less power-intensive digital-first or digital-only solutions.

For example, the active pursuit of electronic payments systems can greatly reduce the need for the creation and transportation of notes and coins, reduce or eliminate the need for paper-based bills and invoices and allow for a reduction in the number of physical processing facilities such as offices. Digital payments services also allow for greater financial inclusion and tax collection, monies that can be reinvested in climate mitigation and adaptation projects well outside the direct influence of telcos.

#### Context: Progressive sector ahead of curve

The telecom sector has, in the last decade, tried to highlight its contribution to climate change. During

this time mobile and fixed network operators have progressively added climate change mitigation and adaptation goals to their existing ESG strategies, often with little prompting via sector regulations or government policies.

Although their initial efforts were concerned with the more tangible and consumer-facing environmental impacts of the industry (the packaging and disposal of communications devices being the most-discussed example), recent years have brought an increased appreciation of the industry's direct impact on climate change – particularly through the consumption of power.

The sector provides both the infrastructure on which the global Internet is based and the ever-growing range of applications and services that enable its use. This infrastructure – and the myriad of devices directly and indirectly connected to it – is one of the biggest consumers of power and, by extension, one of the biggest generators of climate-disrupting carbon emissions.

#### Brand-sensitivity: A key driver for change

The telecom sector is highly competitive and brands need to protect themselves against any consumer backlash, particularly in markets where customers can choose between multiple providers. Factoring in a company's climate credentials when doing so adds to the sector's underlying financial performance pressure.

Many telecom operators and infrastructure providers are also publicly-listed and their share prices can be negatively affected by their attitude to environmental standards: share traders and pension funds are increasingly being directed by their clients to invest in 'greener' companies. The sector is also a wealth generator for governments, not only through traditional channels such as spectrum sales and licensing fees but also,

increasingly, through the use of technology to help economies to become more diversified, inclusive and efficient. As such, commercial sustainability is a prime motivator for telecom companies' efforts to take a leading role in transitioning to a low-carbon world.

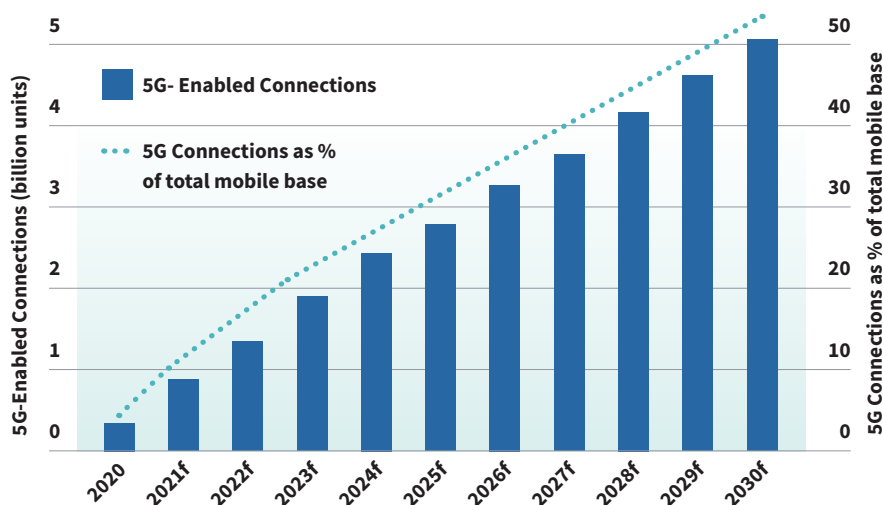
### Changing market paradigms play indirect role

Advances in technology are an intrinsic characteristic in an industry that is constantly reshaping itself, often in response to existing demand, sometimes establishing new paradigms that create new applications and solutions for which demand quickly emerges. Smaller, cheaper and more efficient are the drivers in this sector. And, as new technology standards are adopted, so – almost incidentally – are more climate-friendly adaptations introduced into the sector.

One example is the expansion of mobile and wireline broadband networks into rural areas. This presents two key challenges: lack of access to power grids and the need to build multiple towers and signal repeaters to serve relatively few users. The lack of power grids initially necessitated the use of diesel generators, but the rising costs of transporting diesel have seen operators switch to alternatives such as solar and wind generators. The rising cost of building new towers in areas where a rival was doing likewise initially necessitated shared construction and shared tenancy, eliminating the need for duplicated assets and duplicated towers.

The creation of newer and faster wireless transmission standards – with the move to 5G only just beginning to get underway but set to connect more than 5 billion devices by 2030 (see chart 7) – has brought with it, efficiencies in power consumption, with 5G masts using only a fraction of the power used by previous 2G/3G/4G iterations on a bit-transmission basis (see table 2).

Chart 7. 5G networks consume less power, have a lower carbon footprint



f = Fitch Solutions forecast. Source: Fitch Solutions

The global mobile operators' association, the GSMA, said in a briefing timed to coincide with the COP26 conference in Glasgow in November 2021 that improved connectivity and mobile technology can enable global savings of around 11 billion tonnes of carbon emissions through to 2030. Specifically, smart technology deployed by the four main carbon-intensive sectors of energy, transport buildings and manufacturing – could realise savings equivalent to the decommissioning of 2,700 coal-fired power stations.

Citing examples, the GSMA noted that in the energy sector, connected technology is only used in 35% of solar grids and 10% of wind grids globally. In addition, a mere 5% of the manufacturing sector was using connected technology as of 2021. Yet, these technologies alone could help fulfil almost 40% of the carbon emission cuts required by 2030 if these industries are to reach net-zero by 2050.

Meanwhile, technologically inefficient and expensive-to-maintain copper telephone networks are being replaced with fibre backbones and last-mile connections (FTTx); these fibre networks also consume much less power than the ageing copper systems. These upgrades are demanded by consumers for the faster connectivity they provide; their lower carbon footprints are merely a secondary benefit. A study undertaken by cable manufacturer Prysmian in 2020 found that gigabit passive optical networks (GPONs) consume seven times less power than traditional or enhanced copper (VDSL) networks. Nevertheless, the high energy consumption of consumer devices connected to fibre networks (eg: wireless routers, connected TVs) will keep actual fibre energy consumption profiles relatively high (see table 3).

Table 2. 25x energy efficiency per bit, 4G vs 5G

	4G	5G
Site Power Consumption (Watts)	500	650
Data Transmission Capacity (Mbps)	150	5,000
Bit Power Efficiency (Watt/Mbps)	3.3	0.13

Note: Comparison based on Huawei first-generation 5G base stations; efficiencies reportedly have improved markedly with subsequent iterations. Source: Huawei Technologies, 2019

Table 3. Power consumption profiles of selected wireline technologies

	VDSL2-Vectoring (enhanced copper)	Hybrid fibre-coaxial (cable TV)	FTTH (point to point)	FTTH (GPON)
Active Network Elements	538 street cabinets, 6 switches	794 fibre nodes, 12 switches	36 points of presence	36 points of presence
Power consumption – Access Network (KW)	142	114	64	19
Power consumption – devices (KW)	253	456	341	341
Total power consumption (KW)	396	569	406	360
Total energy consumption (MWh/year)	3,465	4,987	3,557	3,156

Source: Prysmian



**Conclusion: Clear, standardised metrics would help focus climate change mitigation efforts**

While the Telecommunications Index illustrates the relative strengths and weaknesses of the key companies exposed to the challenges of the transition process, the most revealing insights confirm a number of preconceptions.

First, the highest-scoring companies on the Index are based in the biggest and most mature economies of all those assessed. Scale is important in confronting the challenges of a global threat: developed market operators can leverage their extensive customer bases and diverse technology investments to sustainably contribute to managing the transition over the next 2-3 decades. In addition, their deep capital bases give them the scope to use internal and external resources to the optimum and tackle multiple projects head-on. As expected, under-performing companies tend to be those based in emerging and low-growth economies, with limited financial resources or capability to buy in technical expertise. Governments need to provide more financial support – including improving the scope for procuring external financial support – to less agile companies.

Secondly, outperforming companies are mostly responding to or anticipating expectations of a broad mix of important external influences - shareholders, customers and (through regulators) governments – rather than addressing the issue of climate change as a broader operational challenge. Not all of these influences move in sympathy, but brand protection or enhancement does appear to be a common thread. Where projects are undertaken mainly with a view to enhancing a company's credibility, a disproportionate focus on 'easy wins' by prioritising action on internal and immediate indirect emissions (Scope 1 and 2) misses the opportunity to make all contributors to the value chain improve their performance.

Finally, it is notable that – with a few exceptions where telcos are the lead participants in government-developed 'digital-first' economic transformation plans – regulation and policy currently have little to no influence over the sector's role in climate change mitigation/adaptation efforts. Sector-specific regulations touching on this area are still mostly confined to controlling radiation emissions from high-frequency radio systems or outlining standards

regarding the recycling of packaging and hardware. Almost no efforts have been made by any telecom sector regulators regarding key issues such as power utilisation and it has been left to the industry itself to self-regulate and develop its own measures.

A suite of standardised metrics is needed to quantify environmental impacts, as ad hoc initiatives - such as carbon trading, green bonds and carbon offset initiatives - serve only to distort the overall picture. As all companies are now, to differing extents, technology companies, governments need to work with all sectors to clearly define the ways and means by which technology can be employed to make real gains in climate change impact mitigation.

## Transport

### Transport Index

Using the CCIF, the Transport Index seeks to capture the extent to which this sector's companies' operations, investments and strategies fall in line with the Paris Agreement goals of mitigation, adaptation, and contribution to the transition. A fourth vertical – Financial Capability – was also added to the CCIF to assess a company's financial strength and ability to deliver on its climate objectives.



### Mitigation

Assessing a firm's carbon footprint is an important part of the scoring for Mitigation. This is viewed in conjunction with an assessment of the GHG reduction targets and energy efficiency policies and initiatives. Sustainability strategies depend on contributions and commitments to community spend, whilst tech-readiness monitors the use of automation, e-commerce and digitalization. As new smart logistics options and more big data enhancements are adopted in the industry, climate-friendly adaptations will be easier to introduce into the sector as this will enable better monitoring, green-auditing of value chains and cost suppression.

### Contribution

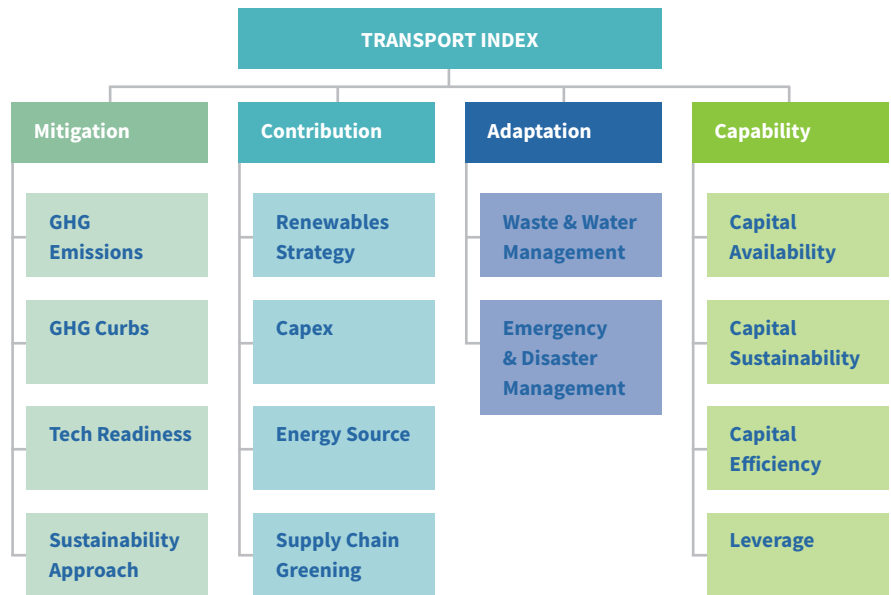
Complying with higher vehicle engine standards, renewing fleets with electric vehicles, boosting renewable energy use and reducing reliance on raw materials will require large capital outlays. This needs to be the focus of investment in the transport sector and will highlight some of what is required within Contribution.

### Adaptation

Most companies report well on Mitigation and Contribution especially on investment in low carbon technologies and revenue from green sources. There is, however, limited quantifiable data on the physical risks around climate change, especially at a company level.

The scoring of adaptation is based on a company's exposure to physical climate risks in the countries in which it operates and the willingness and ability of key stakeholders to adapt to climate change. The former is proxied by how firms are managing water, integrating waste reduction strategies in their operations, particularly surrounding packaging and the degree to which regulatory changes are driving faster progress in waste reduction and management. Waste management within the transport sector has been and continues to

Figure 6. Transport Index composition



be extensively regulated by national and local agencies. Regulations around the banning of non-biodegradable packaging materials is putting pressure on companies, which could increase operating costs, particularly in locations where green alternatives are not locally produced.

### Context: Transport sector faces challenging decarbonisation path

Currently, the transport sector is highly dependent (99%) on non-renewable fossil fuels, the combustion of which results in the emissions of air pollutants. For companies in this sector, increasing the share of cleaner conventional and alternative fuels and the greater use of electric vehicles for road transport have become key decarbonisation priority areas. They need to as in line with the Paris Agreement and the UNs Sustainable Development Goals (SDGs), countries across the globe are tightening measures and regulations particularly surrounding the energy and transport sectors in order to meet their respective climate change objectives.

The transport sector faces a challenging adjustment to a low carbon economy, particularly in Asia. Latest data from the Global Carbon Project shows that Asia's share of global CO<sub>2</sub> emissions stood at 56% in 2019 and 58% in 2020, with China accounting for 50.9% of Asia's CO<sub>2</sub> emissions in 2019 and India representing 12.7% of emissions from Asia. Overall, the transport sector is the second largest contributor

to GHG emissions, accounting for 16.2% of global emissions, after 'energy used in industry' which accounts for 24.2%, according to the latest data from the World Resources Institute. Over 90% of overland freight movements occur via road, while rail and inland waterway transport accounts for a small share of regional cargo movement.

Within the transport sector, road transport, which accounts for 11.9% of annual global GHG is the largest emitter, with 40% of emissions being attributable to road freight, while 60% stems from passenger vehicles. This means that, if all stakeholders, globally, could electrify the whole road transport sector, and transition to a fully decarbonised electricity mix, the global reduction in emissions will be considerable. Firms that will likely lead the charge in this regard will largely be based in more advanced economies, benefitting from strong state support (in the form of incentives and regulations), green industry cluster development (through vertical and horizontal supply chain integration) and improving hard infrastructure (in the form of renewable-energy-based backbone infrastructure and increasing proliferation of vehicle charging stations). This also infers that firms with a high reliance on road freight and limited diversification options in the form of air, rail and water transport face a higher cost pressure in the years ahead to decarbonise their road-reliant fleets.

- **Incentives have been geared to boost the use of green fuels**, low-carbon alternative freight modes such as rail and inland waterways, scrappage of old vehicles and the adoption of EVs.
- **Regulatory fines and sanctions are becoming more commonplace.** These can include restrictions on dirtier (high sulphur) fuels, fines for older vehicles, surcharges on the use of ICEs, the application of higher carbon taxes, alternate-day car bans and the implementation of ICE bans in favour of EVs and vehicles powered by cleaner fuels such as hydrogen.

Firms offering flexible multimodal solutions – covering air, ocean, road and rail freight – are well-positioned to lower their emissions in the near term through route and freight mode optimisation and further diversification away from ICE vehicles. Aviation accounts for 1.9% of annual global GHG, followed by shipping (1.7%), rail (0.4%) and pipelines (0.3%). Road vehicles account for nearly three quarters of transport CO<sub>2</sub> emissions, and, while low in comparison, emissions from aviation and shipping continue to rise (see chart 8).

Consequently, incentives and regulations geared to reduce emissions and improve air quality have tightened, particularly in major cities across the Asia region.

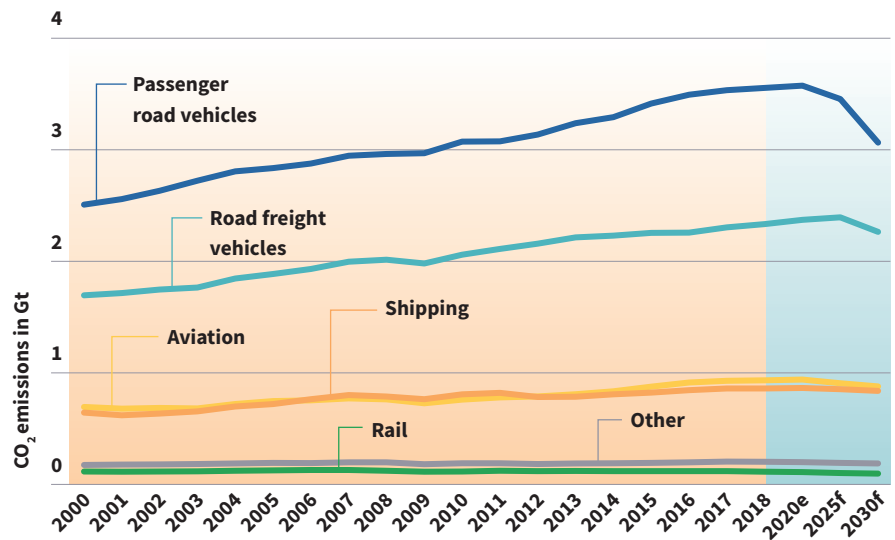
### Green transition will gain traction with regulatory push

Cleaner, greener fuel use, particularly in the transport sector was one of the key issues on the agenda for UN climate talks in Glasgow (COP26) as leaders met to discuss emissions cuts and net-zero commitments. There are three major aspects to commercial emissions reductions strategies that firms will pursue in the near term:

1. **Reducing** the use of fossil fuels with higher emissions and making modifications to existing fleets with the use of bridging fuels (such as LNG, biofuels)
2. **Increasing** the use of hydrogen-based and electric vehicles
3. **Improving** efficiency of cargo movement through the use of automation that will streamline resources and optimise route selection (to reduce unnecessary trips.)

That said in the road sector, governments are pushing transport firms to use cleaner fuels and reduce emissions to a greater extent than observed in the aviation and shipping sectors, where greener fuel technologies are more nascent and/or still in prototype phases. Rail transport accounts for a small share of regional cargo movement with over 90% of overland freight movements occurring via road.

Chart 8: Transport sector CO<sub>2</sub> emissions in Gt by mode in the Sustainable Development Scenario, 2000-2030



Note: e= estimate; f= forecast. Source: International Energy Agency, International Council On Clean Transportation

### Electric vehicles: key step in greening supply chains

As countries seek to reduce the impact of emissions from transport on climate change and to comply with the GHG reduction goals under the Paris Agreement, targets for phasing out new ICE car sales or registrations will be increasingly relevant for contribution and mitigation efforts. While high emissions standards on ICE will impact investment decisions in the short term, the longer-term transition to zero-emission vehicles is necessary to reach these goals. Overall, the national and sub-national governments that have committed to targets for phasing out new sales or registrations of ICE vehicles have sent a clear signal, even if it is not currently possible (due to limitations in the maturity of required technologies) for the targets to be implemented in the form of binding regulations. Looking at the three largest vehicle markets by sales in Asia – China, Japan, and India – there is not yet any strong commitment toward 100% new zero-emission passenger car registrations or sales. Indeed, the relatively slow pace of EV adoption in major autos market in the Asia region, namely Japan and India, will act as a major drag on the region's overall growth outlook over 2021-2030. While India has stated its commitment to support the local EV industry and has implemented some supporting policies, the country's limited domestic EV supply chain and its relatively low-income consumer base will remain a significant barrier to faster EV adoption. Similar to India, Japan has also stated its intentions to decarbonise its economy however, it has yet to offer consumers solid incentives to purchase EVs. However, Japan's move to aggressively seek carbon neutrality by 2050 and the potential for an internal combustion engine (ICE) ban in the mid-2030s, offers the country's still nascent EV market significant growth potential. Japan will still allow the sale of new hybrid electric vehicles (HEVs) after 2035.

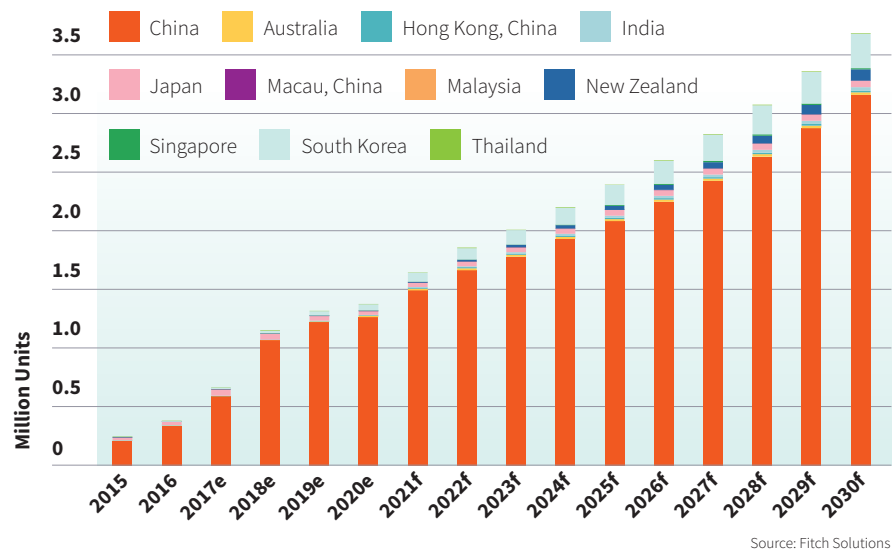
Electric vehicle deployment has been growing rapidly over the past decade in the region and electric car registrations increased significantly in 2020 and 2021, despite the pandemic-related worldwide downturn in overall vehicle sales. The Asia region's EV market will continue to grow at a fast pace as more countries in the region look to support EV uptake, reduce emissions and attract EV-related manufacturing investment. However, the region's EV sales will start to fall behind other regions largely due to weak EV uptake in Japan and India. Fitch Solutions estimates that EV sales in Asia expanded by 19.6% in 2021, up from estimated growth of just 4.4% in 2020 and that total EV sales in the region will reach a high of just under 3.6mn units by the end of 2030, up from an estimated sales volume of just over 1.4mn units in 2020. The region's EV sales will be primarily driven by China as Fitch Solutions estimates that the country accounted for 91.9% of all EV sales in Asia in 2020. China will remain the regional giant when it comes to EVs due to the availability of affordable EV options, rising incomes, the proliferation of charging infrastructure and the existence of supportive incentives for autos manufacturers. Meanwhile India and Japan (two of the largest vehicle markets globally) are still in the very early stage of EV adoption. India specifically will struggle to support EV adoption given its lack of EV charging stations, its low-income population and the limited local EV supply chain. That said, we expect the Chinese EV market share in Asia to drop steadily, reaching 88.7% by 2030, as more countries implement purchasing incentives and adopt carbon-neutrality targets. South Korean EV sales will hold a market share of 6.3% and New Zealand's EV sales will take third place in the region with a regional market share of 1.9% by 2030.

**Conclusion: Robust investment in new fuels and clean technologies will support transition**

Companies in the transport sector have an incentive to align themselves with the PCA goals, largely driven by government regulations, which will only increase following COP26. Several governments across the region have already raised vehicle emissions standards in recent years and failure to meet relevant regulations on engine standards will result in considerable legal risks and fines. In addition, states such as Singapore are leading the pack in terms of rolling out restrictions/ outright bans on ICE vehicles in the next two decades. In anticipation of tighter policies largely geared towards curbing GHG, firms need to move to green their supply chains in order to reduce legal and reputational risks. To reduce scope 1 emissions, scale is important in confronting the emissions challenges and many global firms, particularly in the capital-intensive shipping sector, are forming partnerships and investing in their own cleaner energy options in order to lower costs, as national regulations and IMO rules tighten. When it comes to vehicle emissions, and EV adoption across different countries, businesses face the challenges of the uneven availability of adequate EV incentive structures and charging infrastructure gaps. In addition, while China is leading the charge in EV sales, the baseload energy used to power vehicles will be largely coal-fired power-based, which limits scope 2 and 3 advantages compared to locations such as South Korea, New Zealand and Japan with lower emissions from their power generation facilities.

Mitigation measures reducing emissions will also generally lead to a combination of enhanced operational efficiencies, increased use of automation and tech-enabled methods to boost route optimisation and lower energy use. Higher initial input costs (purchasing new vessels or vehicles and establishing the supporting infrastructure around these developments) will be eventually offset by the reduced obligations associated with carbon taxes, legal fines and the reduced need for conventional fuels. Firms with multi-modal freight avenues (i.e. those that are diversifying from relying purely on road freight) will also benefit from higher efficiency, lower expenditures and increased revenues, improving profitability overall. On the whole, those companies which scored best in the index were those which not only had the most developed mitigation strategies, but were also most successful in aligning their operations with a top-down sustainability approach, allowing them to achieve deeper and more durable decarbonisation trajectories.

Chart 8: Asia - Electric vehicle sales by location, 2015-2030



For firms in the transport sector, key reporting aspects of their respective decarbonisation strategies include the level of detail and completeness of their decarbonisation plans, the intended reporting mechanisms and frequency, the use of carbon credits (international offsets), GHG coverage (countries, regions, cities) and Scope 3 coverage – ensuring the company’s transition covers the full value chain, including downstream and upstream processes. In developing this index, there were several data issues to negotiate: low frequency, limited availability, quality concerns and a lack of standardisation all presented themselves as problems. Where data was lacking, companies were penalised on the basis that full transparency is critical to assessing and achieving progress towards the Paris Agreement goals. The data that was available often relied heavily on self-reporting by the companies themselves, raising questions around the adequacy of their data collection processes and methodologies. A related issue is that of standardisation; companies reporting on the same indicator would often do so using different metrics, measured against different baselines and over different time horizons, all rendering like-for-like comparisons difficult.

Overall, our index highlights a number of potential actions that transport firms need to emphasise across all of the Paris Agreement’s pillars. The findings from the index and our analysis show that the highest-scoring companies, particularly for the contribution and mitigation pillars, are mainly based in the advanced economies that have implemented stricter regulations on emissions and these firms’ supply chains also have a presence in several countries as well. Transport firms would be best

served by applying the decarbonisation rules of the strictest jurisdiction they operate in to boost their green credentials. In order to do this, the first step is to ensure adequate reporting of sustainability data and activities across all locations where a firm operates.

Meeting the objectives of the Paris Agreement will be better served by the provision of timelier, more granular and more standardised indicators, safeguarded by third party verification procedures. The gap in reporting standards between mitigation and contribution on the one hand and adaptation on the other remains significant, and companies need to show investors, lenders and other key stakeholders more clearly how they are planning to adapt to the needs of a low-carbon economy.

The best way for companies to capitalise on opportunities in the transport sector and tackle the climate challenge is to begin:

- Investing in EVs, and engine technologies that employ greener fuels.
- Investing in supporting infrastructure such as charging stations and additional technological improvements on vehicle and shipping fleets in particular to accommodate greener fuel use.
- Diversifying transport modes away from fossil-fuel-reliant road freight and increasing use of rail, inland waterways and cleaner maritime transport to benefit from economies of scale and cleaner readily available freight options.

## Energy

### Energy Index

Using the CCIF, the Energy Index seeks to capture the extent to which this sector's companies' operations, investments and strategies fall in line with the Paris Agreement goals of mitigation, adaptation, and contribution to the transition. A fourth vertical – Financial Capability – was also added to the CCIF to assess a company's financial strength and ability to deliver on its climate objectives.



### Mitigation

Mitigation is measured across a number of indicators as shown above. Where possible, the Index uses quantitative data points to compare performance across companies. This has been augmented by some more qualitative assessments, either to adjust the scores where, due to data issues, direct comparison was not possible, or where the data did not fully reflect a company's performance.

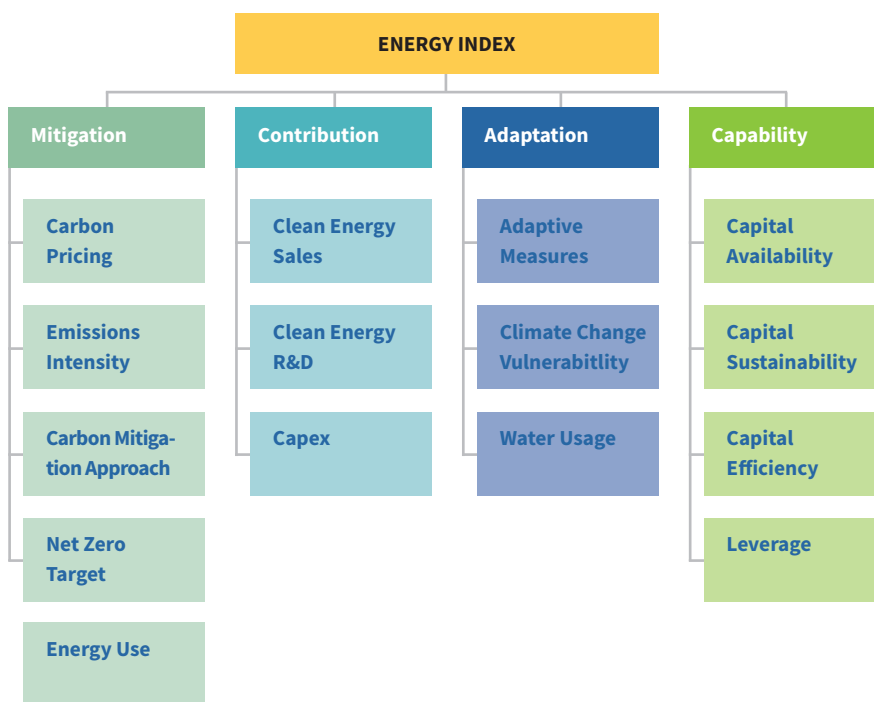
Given the sector's large contribution to overall GHG emissions, efforts by oil and gas companies to reduce both the emissions intensity of their operations and their absolute emissions levels will be critical if the objectives of the Paris Agreement are to be met. Oil demand has yet to peak, while gas demand will likely continue growing for a decade or more. In light of expected and substantial further production gains, it becomes all the more imperative that the sector takes immediate action to curb its carbon footprint. Partly as a result of this, companies have so far focused principally on mitigation in their efforts to align with the Agreement.

In the main companies have so far targeted direct emissions. Typically, mitigation strategies have included:

- the divestment of emissions-intensive assets;
- the streamlining of portfolios to improve economies of scale, exploit operational synergies and yield productivity and efficiency gains;
- equipment upgrades and process improvements;
- electrification and the switch to renewables to power operations;
- carbon offsetting; and
- the deployment of digital technologies.

Although many of these approaches require some initial capital outlay, in the main they will also lead to lower expenditures and higher profitability over time, boosting the bottom line, as well as reducing emissions. In focusing on mitigation, companies typically do not have to

Figure 7. Energy Index composition



stray far from their core competencies. Mitigation measures are generally low risk, often relatively low cost and can yield near-term financial gains in the form of, for example, lower energy requirements, reduced wastage and improved operating efficiencies.

### Contribution

It is more difficult to assess contribution to the transition on a purely quantitative basis. In part this relates to issues of data availability, given that companies do not tend to disclose sufficiently granular data relating to clean energy as a source of revenue and expenditure. Differing opinions as to which products, technologies and services are truly 'green' further complicates the process. Proxies were used for each company's contribution using its overall capital expenditure, the share of its total investments that are funnelled into clean energy R&D and clean energy sales as a proportion of total revenues.

Overall, less emphasis has been placed by companies on contribution to the transition than on mitigation. Given the large role for oil and gas in the primary energy mix and their dominance in certain sectors, such as transport, investment in alternative energies to replace fossils fuels – either as drop in fuels, or via retrofitting or the development of new infrastructure – is crucial to achieving the goals of the Paris Agreement. Investing in these alternatives is also vital from a company perspective, as it will allow them to diversify away from the sale of oil and gas to end users. Without this, they cannot hope to achieve net zero emissions on a Scope 3 basis.

The Contribution vertical saw the largest disparity in scores between the best and worst performing companies. While most companies have at least some mitigation strategy in place, active contributions to this transition are less ubiquitous. Contribution to the low carbon transition can take a variety of forms, but common examples are investments in renewable generation capacity, electric mobility, hydrogen, biofuels and e-fuels, carbon capture and storage and energy efficiency. Some companies would add natural gas to this list, but that inclusion is contentious and we have omitted it for the purposes of this Index. Natural gas is generally less emissions-intensive than oil or coal, but is a significant source of global GHG emissions. Switching to natural gas can, in some cases, yield meaningful emissions reductions, but it can also divert resources away from cleaner energies and, if emissions are unabated, may lead to carbon lock-in.

### Adaptation

The scoring of adaptation is based on a company's exposure to physical climate risks in the countries in which it operates and the willingness and ability of these countries to adapt to climate change. The former is proxied by the level of water stress and the risk of droughts, floods, cyclones, tsunamis and earthquakes. The latter is proxied on a range of social, political, legal, institutional and economic indicators, as well as assessments of operational and project-level risk factors.

The use of country rather than company-level indicators reflects the paucity of company data and reporting surrounding adaptation. Those companies with operations in high-risk markets with low adaptive capacity are substantially more vulnerable to physical climate risks, which could meaningfully impact on their operational and financial performance over time. Reducing their presence in these markets or investing in defensive measures would help manage this exposure, but few companies have adequately addressed the issue to date.

Physical climate risks are difficult to quantify over a multi-decade horizon and involve a considerable degree of uncertainty. While companies are facing far greater scrutiny in regards mitigation, little attention has been paid to their adaptive investments or capacity. Improving resilience can take any number of forms including:

- applying higher design and construction standards for infrastructure in areas vulnerable to hurricanes and cyclones;
- building flood defences in areas prone to flooding;
- establishing fire breaks in areas at higher risk of wildfires; or
- investing in desalination capacity in areas of high-water stress.

In many cases, companies report on business continuity plans and crisis risk management procedures, but information on investments to improve their resilience to climate change is sorely lacking. This may reflect the greater emphasis placed on mitigation by governments, investors and consumers or the higher degree of uncertainty around physical climate risks, or indeed the asset-level nature of adaptive investments.

### **Context: Energy sector faces challenging adjustment to low carbon economy**

Given its highly emissions-intensive business nature, the oil and gas sector faces a challenging adjustment to a low carbon economy. Indeed, its traditional business model now has limited room to run and those companies that fail to divorce their revenue growth from their emissions growth will see their profitability fall and balance sheets degraded over time.

However, adjusting to the transition breeds opportunity as well as risk. Companies that can secure a lasting role in the low carbon economy will profit from access to new products and services and create for themselves a more resilient business model. But this adjustment will be challenging. Companies must shift away from their core competencies and venture into

Table 4. New energy alternatives and level of maturity

Alternatives	Description	Technological Maturity
<b>Advanced Biofuels</b>	Liquid fuels derived from non-food-based feedstocks, such as agricultural residues or municipal waste	Low
<b>Green Hydrogen</b>	Hydrogen produced via electrolysis using renewable power sources	Medium-Low
<b>Blue Hydrogen</b>	Hydrogen produced via steam methane reforming with the application of capture technology	Medium
<b>Hydrogen-Based Fuels</b>	Fuels such as ammonia	Medium-Low
<b>Carbon Capture, Utilisation, and Storage</b>	Technologies to capture carbon emissions on site for reuse or storage	Medium
<b>Direct Air Capture</b>	Technologies that capture carbon dioxide directly from the ambient air for reuse or storage	Very Low

new and often quite nascent technologies (see table above). Moreover, the traditional oil and gas business will remain the key source of funding for these new ventures over at least the coming one-to-two decades. Companies will have to walk a tightrope, as they wind down investment in the former, while ramping up spending on the latter. The large upfront capital requirements typical of many oil and gas projects, the long-lived nature of the asset base and an increasingly uncertain legal and regulatory outlook only serve to complicate the issue. Most companies have yet to embark upon this path, with the majority continuing to target long-term growth in their oil and gas production, combined with substantial declines in emissions intensity. The European majors are an exception, with BP a notable example, committing to a 40% reduction in its oil and gas output by 2030, as capital expenditure is redirected towards low carbon business lines.

### **Corporate laggards face missed opportunity and greater risk**

The extent to which companies are currently committing to the transition varies considerably, in part reflecting a wide disparity in the energy policies in place across different markets and regions. The European Union has among the most stringent of regulatory environments, including rigorous permitting processes, high disclosure requirements, often unfavourable

fiscal terms and, in some cases, outright bans on oil and gas activities. This contrasts sharply with the policies in place across many markets in the Middle East, Africa, Asia and Latin America, which continue to actively promote expansion of the sector. Of these latter regions, sustainable energy policies are generally more advanced in Asia and a number of the major economies – including China, Japan, Indonesia, South Korea, Australia, Thailand and Malaysia – have committed to achieve net zero emissions by 2050-2070. However, Asian countries continue to emphasise a substantial increase in the role for gas over the long term and it is not uncommon to see ambitious renewables targets set alongside ambitious targets for oil and gas production growth. Many countries continue to enact fiscal and regulatory reforms, in an attempt to draw increased investment into both the upstream and downstream industries. As a rule of thumb, those countries in which oil and gas plays a more important role in the economy tend to have weaker environmental protections in place and create less impetus for change. Nevertheless, many companies active in those countries are beginning to develop their own strategies in response to the Paris Agreement.

On the right is a snapshot – taken from Fitch Solutions’ Sustainable Energy Policy Index – that highlights how the different regions score in terms of the extent to which their domestic policies are in line with the Paris Agreement.

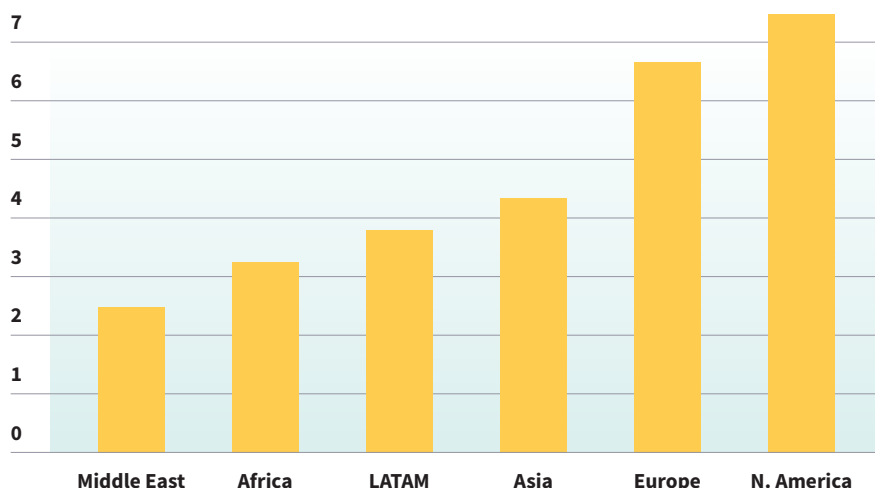
Domestic energy policy is not the only driver accelerating the transition and policies can impact across borders. The oil and gas sector is highly globalised and those companies that are lagging on their climate commitments may face reduced access to markets abroad, heavier discounts on their products sold and a higher cost of capital, raising expenditure and reducing revenue. Climate-related litigation against oil and gas companies has also been expanding exponentially and legal and reputational risks will only rise with time, in line with a growing awareness of climate issues, enhanced reporting requirements and more established legal precedents. Moreover, increased cross-border cooperation, under the auspices of the Paris Agreement, should lead to a more robust policy and regulatory environment at the global level. An effective international carbon pricing scheme, stronger climate-related funding initiatives and cross-border carbon tax adjustments could all materially impact on the financial performance of even those companies operating in low regulation markets. Ultimately, the onus is on each individual company to move its strategy in line with the goals of the Paris Agreement, to maximise the potential benefits from the transition and minimise the risks that they face.

**Conclusion: Higher reporting standards urgently needed**

The Energy Index sheds light on the stark divergence in performance across different companies and in different markets. As a group, the European-based integrated energy companies have notably outperformed players from other regions, underscoring the importance of an appropriate policy backdrop and strong reporting requirements. The EU has among the most extensive non-financial disclosure requirements of any market globally and continues to expand them. This, combined with a high level of public scrutiny, encourages companies to develop their strategies in line with the goals of the Paris Agreement, even though many of their operations are based in markets with significantly weaker environmental regulations.

Companies incorporated in low regulation jurisdictions were more likely to appear towards the bottom of the Index. These companies often face less regulatory oversight, weaker environmental assessment processes, fewer environmental mandates (such as emissions intensity caps), and enjoy continued fiscal support for fossil fuel investments. Overall, this gives them substantially less impetus to change

Chart 9. Regional energy policy scores by Paris Agreement NDCs



Source: Fitch Solutions  
 Note: Scores are out of 10; higher scores denote domestic policies more in line with Paris Agreement goals.

their behaviour. While policy holds substantial sway over company performance, other factors, such as the quality of corporate governance and responsiveness to consumer preferences, shareholder pressure and market forces are also very much in play.

Companies have an incentive to align themselves with the Paris Agreement. On the one hand, it pre-empts tighter policies and regulations as they evolve. It also bolsters the public’s perception of them and reduces legal and reputational risks. Moreover, it benefits the company from a purely business perspective. To date, these gains have been most apparent in regards of mitigation. The mitigation measures discussed above have generally led to a combination of higher operational efficiencies, reduced downtime, lower energy use and lower energy input costs. This, compounded by the lower costs associated with carbon taxes and emissions trading schemes, can both cut expenditures and increase revenues, improving profitability overall. On the whole, those companies which outperformed were those which not only had the most developed mitigation strategies, but were also most successful in tilting their business away from their core oil and gas activities into clean energy products and services. This opens up new revenue streams in new markets, positions the company for more stable and sustainable revenue growth, and allows them to achieve deeper decarbonisation on a Scope 3 basis.

In developing this Index, there were many data issues to negotiate: low frequency, limited availability, quality concerns and a lack of standardisation all presented themselves as problems. Where data was lacking, companies were penalised heavily on the basis that full transparency is critical to assessing and achieving progress

towards the Paris Agreement goals. The data that was available often relied heavily on self-reporting by the companies themselves, raising questions around the adequacy of their data collection processes and the methodologies they apply.

A related issue is that of standardisation: companies reporting on the same indicator would often do so using different metrics, measured against different baselines and over different time horizons, all rendering like-for-like comparisons extremely difficult. Meeting the objectives of the Paris Agreement would be better served by the provision of timelier, more granular and more standardised indicators, safeguarded by third party verification procedures. A shift away from Scope 1 & 2, to Scope 3 reporting would also be beneficial, given that the bulk of emissions in the oil and gas sector are incurred downstream, rather than through the companies’ own operations.

Perhaps the most interesting finding was the wide gap between the reporting on mitigation and contribution on the one hand and adaptation on the other. The oil and gas sector is heavily exposed to physical climate risks, both chronic and acute. This is due to a number of factors, including the typically long lifespan of its infrastructure, the tendency for operations to be located in areas with a high degree of vulnerability to extreme weather events, the globalised nature of the industry’s supply chains and its large energy and water requirements. Oil and gas companies have already incurred heavy losses related to extreme weather events and these are only likely to increase in frequency and severity over time. Despite this, discussion of physical climate risks is minimal and, in most cases, it remains unclear as to whether companies are adequately internalising the threat of these risks, or making the necessary investments to mitigate or manage them.

# 3. The Carbon Trust: Company case studies

The Carbon Trust systematically tested and applied the Framework on selected companies, assessing their performance against the three objectives of the Paris Agreement: Climate Mitigation, Climate Adaptation and Contribution to the Transition. Case studies about the companies were developed to demonstrate how the CCIF can be used. The companies shortlisted for these case studies were selected based on their efforts in public, internationally recognised climate-related rankings, or coalitions.

## Summary findings

This analysis compiles company case studies from the following sectors: autos, basic industries, energy, healthcare, technology & electronics, telecom, transportation, and utilities. These companies were among some of the progressive organizations incorporating climate mitigation and adaptation strategies in their operations. The geographies covered include China, India, South Korea, and Singapore. Key findings are outlined below.

**1. Greater focus on renewable energy and GHG measurement.** Most of the sampled companies adopted climate mitigation strategies by procuring renewable energy and measuring and reporting at least Scope 1 and Scope 2 GHG emissions. Fewer companies have set 1.5-degree science-based targets and/or publicly committed to net zero goals.

**2. More efforts needed to devise and implement detailed adaptation measures.** Most of the sampled companies conducted physical climate risk assessments. However, few companies incorporated financial analyses and implemented measures to respond to these risks. In addition, while many companies disclosed their climate mitigation plans, few companies focused on long-term climate adaptation plans.

**3. Growing investment into green technologies and integration of circular economy in operations:** Most companies focused on optimizing energy consumption across their products and services through investments in energy-efficient technologies. Continuous research and development initiatives for exploring green technologies in most of the sampled sectors were observed. Life cycle assessment was also a commonly observed practice among the companies identifying and managing material consumption across their portfolios.

## 3.2 Methodology

**Company selection:** The nine sample companies were selected from a database of companies that were featured or ranked in SBTi, CDP, RE100, Global 100, TCFD supporters and the TPI. Companies that achieved a CDP score of “F” or “N/A” were omitted during the selection process.

The companies selected for analysis are listed below in Table 5. Some companies have been anonymized at their request.

**Company interviews:** The case studies capture publicly available information which are verified by the company. Where there was little public information, interviews were held to better understand the company’s short- and long-term plans and climate motivations.

**Scoring:** Under the CCIF, companies that perform strongly on one or two objectives are classified as B-List, and companies that perform strongly on all three objectives are classified as A-List. The Carbon Trust’s scoring methodology consists of a customised questionnaire based on the Carbon Trust’s Climate Leadership Framework (CLF) as well as the Transition Pathway Initiative (TPI). The questions are separated into the three objectives of the Paris Agreement, addressing the key considerations for each objective noted by the CCIF. Recognizing that addressing climate change is a journey for most companies, the questions were designed to differentiate the extent of which each company is addressing each objective. As examples:

**Climate Change Mitigation:** The scoring system will give different scores to companies that have set targets for their own operations only and those that have included their value chain in their target setting. The scoring also considers whether a company has a clear implementation plan to start its journey for meeting climate targets.

**Climate Change Adaptation:** The scoring system will give different scores to companies that have assessed physical risks for their

own assets only versus those that have also considered their value chain in their climate risk assessments. The scoring also differentiates between qualitative assessment and quantitative assessment of the risk

**Contribution to transition:** The scoring system will consider whether the company has a plan to estimate the enablement impact of its products and services. The scoring also differentiates between a company that has publicly disclosed any quantitative indicators for their contribution.

As the case studies cover a wide range of sectors, the total number of questions applicable for each selected company may not be the same. Each applicable question is assigned a score on a scale of 1 to 4, with 4 being the best performance. A-Listers are identified as companies whose total score fall within the top one-third of the maximum score applicable to them, and those whose total score achieved lie below this threshold are determined to be B-Listers.

The Carbon Trust’s scoring methodology seeks to be complementary to existing rankings and coalitions in providing a holistic view of areas where Asian companies can go further in terms of climate mitigation, adaptation, and contribution to the transition.<sup>7</sup>

## Case studies

The following case studies present a snapshot of companies’ climate performance using the CCIF and the Carbon Trust’s scoring methodology and include the Carbon Trust’s recommendations on next steps for achieving the main objectives of the Paris Agreement.

Table 5. Companies featured in the case studies

Company	Sector	Headquarters location
Greentech Company (Anonymized)	Technology & Electronics	China
Dr. Reddy’s Laboratories Limited	Pharmaceuticals, Biotechnology & Life	India
ICT Company (Anonymized)	Information & Communications Technology (ICT)	China
Mahindra & Mahindra Ltd.	Automotive manufacturing	India
Samsung SDI Co. Ltd.	Technology & Electronics	South Korea
Singapore Telecommunications Limited (Singtel)	Information & Communications Technology (ICT)	Singapore
TCL Electronics Holdings Limited	Technology & Electronics	China
Vena Energy	Energy & Utilities	Singapore
Zuellig Pharma	Pharmaceuticals, Biotechnology & Life	Singapore



# Greentech Company (Anonymized)

**Headquarters:** China

**Sector:** Technology & Electronics

About the company: The company is a Greentech business which designs, sells, and operates smart wind turbines, AIoT-powered batteries and AIoT operating systems. The company was ranked among the Top 10 of the 2019 'World's 50 Smartest Companies' by the MIT Technology Review. It leverages a global network of R&D and engineering centres across China, and the rest of the world. It joined the global 'RE100' initiative and committed to 100% renewable electricity by 2025.

**Analysis: The company potentially falls under the B-List classification upon applying the CCIF and Carbon Trust's scoring methodology.**

The company has made strong efforts that align to the "Climate Mitigation" objective of the AIB-Amundi Climate Change Investment Framework but can improve in efforts aligning to the "Climate Adaptation" objective. Its focus on supporting a low-carbon economy also contributes strongly to transition. A strong science-based target aligned to 1.5 degrees, Scope 3 target setting, and physical climate risk analysis and management would be the important next steps.

**Context for technology & electronics sector:**

- China has pledged to achieve carbon neutrality before 2060 and peak emissions before 2030.
- The following factors are contributing to China's energy transition: the planned restriction on coal consumption, the decreasing costs of wind and solar energy sources is supporting renewable energy supply; and on the demand side, the increase in the use of distributed energy sources including rooftop solar PV systems and electric vehicle fleets is emerging as complement to utility-scale renewable energy generation.

Paris Agreement Objective	Greentech Company: Current Climate Actions
Climate Change Mitigation	<p><b>Committed to ambitious goals related to carbon neutrality and science-based targets.</b></p> <ul style="list-style-type: none"> <li>• Aims to reach carbon neutrality within its operations by 2022<sup>a</sup> and across its supply chain by 2028 and has set a net zero target by 2040 across both its operations and supply chain.</li> <li>• It is also a member of the Business Ambition for 1.5 campaign, advocating an urgent call to action from a global coalition of UN agencies, business, and industry leaders, in partnership with the Race to Zero.</li> </ul> <p><b>Measured the company's carbon footprint across the global operations under its direct control and supply chain.</b></p> <ul style="list-style-type: none"> <li>• The company reports its greenhouse gas (GHG) emissions in 2020 (tCO<sub>2</sub>e) broken down by Scope 1, Scope 2 (Location-Based), Scope 2 (Market-Based) and Scope 3.</li> <li>• Over 90% of its GHG emissions in 2020 came from indirect sources across the supply chain.</li> </ul> <p><b>Utilised an internal carbon pricing (ICP) tool to price in the cost of emissions in their current and future operations and investments.</b></p> <ul style="list-style-type: none"> <li>• ICP tool that is benchmarked to different markets allows for future transition risk to be priced into investment decision making for projects.</li> </ul>
Climate Change Mitigation & Contribution to the Transition	<p><b>Conducts lifecycle assessments and carbon footprinting for other products.</b></p> <ul style="list-style-type: none"> <li>• Lifecycle footprint of its wind turbine in China has set an industry benchmark.</li> <li>• They are also conducting carbon emission footprint of other products, such as solar panels and for their digital division – electronic devices.</li> </ul>
Climate Change Adaptation	<p><b>Made efforts to increase the resilience of its assets to climate change and encouraged suppliers to move to areas where there is lower likelihood of climate hazards.</b></p> <ul style="list-style-type: none"> <li>• Majority of its operations are in Asian geographies that tend to have medium to high climate change risk affected by physical risks such as flooding, rising sea levels and typhoons.</li> </ul>
Contribution to Transition	<p><b>Dedicated its Research &amp; Development (R&amp;D) efforts towards the areas of renewable energy, carbon management, energy efficiency, renewable energy certificate and carbon trading.</b></p> <ul style="list-style-type: none"> <li>• The company mentions that 100% of its revenue stream stems from products and services designed for a low-carbon and climate resilient economy.</li> <li>• The company utilises a carbon management AIoT software throughout their operations and this helped to reduce overall carbon emissions. Over 300 organizations are using the software worldwide, out of which 100 companies are within the company's own value chain, helping to manage more than 1 billion tons of carbon emissions.</li> </ul>

## Challenges and key learnings

**1.** Proactively implement internal carbon pricing as internal decision-making tool.

The company recognises that it could be affected by carbon pricing across Asia geographies where its largest manufacturing plants are located. While it has not been directly impacted by carbon taxes, the company adopts a forward-looking perspective by using internal carbon pricing as a tool to evaluate any new investments, allowing for future financial costs of emissions to be priced into decision making today.

**2.** Setting robust and ambitious targets supports climate ambitions of internal and external stakeholders.

The company announced its goal to reach carbon neutrality within its operations by 2022 and across its supply chain by 2028. It has also raised its ambition further by committing to set a science-based target aligned with the Paris Agreement to limit global warming to 1.5°C. These are positive steps in the right direction and serve to align sustainability efforts both internally and externally towards a common goal.

**3.** R&D efforts in low-carbon transition is important to remain competitive.

Although 100% of the company's revenue stream stems from products and services designed for a low-carbon and climate resilient economy, it continues to focus its R&D efforts on renewable energy, carbon management, energy efficiency, renewable energy certificate and carbon trading. This ensures that the company continues to be relevant and competitive in the future climate-vulnerable markets.

Paris Agreement Objective	Greentech Company: Future Climate Plans <sup>9</sup>
Climate Change Mitigation	<p><b>Reduce and offset projected emissions in 2022.</b></p> <ul style="list-style-type: none"> <li>This is in line with its goal to reach carbon neutrality within its operations by end of 2022. A variety of measures will be adopted including reducing its own energy usage and emissions, increasing green electricity consumption, and purchasing carbon credits.</li> </ul>
	<p><b>Adopt a two-pronged approach to reduce GHG emissions across its supply chain.</b></p> <ul style="list-style-type: none"> <li>Internally: Focus on product optimisation for instance, refine product design to enhance energy performance; reduce emissions from product usage; as well as source lower-carbon production materials.</li> <li>Externally: Help its supplier partners explore energy-efficient opportunities to reduce the carbon footprints of their manufacturing operations over time.</li> </ul>
	<p><b>Set both near term SBTi targets and target date for net zero commitment, including Scope 3.</b></p> <ul style="list-style-type: none"> <li>Building on its carbon neutrality goal for 2022, net zero goal for 2040, and scope 3 footprinting, the company has a good foundation and is planning to submit its SBTs by end of 2022 .</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Engage value chain partners more to enable detailed Scope 3 target setting.</b></p> <ul style="list-style-type: none"> <li>Setting detailed Scope 3 targets can support the company in meeting its transition goals for electrified transport across logistics partners.</li> </ul>
Climate Change Adaptation	<p><b>Improve quantitative assessment of its supply chain's exposure to physical risks.</b></p> <ul style="list-style-type: none"> <li>Besides encouraging suppliers to move to areas where there is lower likelihood of climate hazards, the company could further assess its supply chain's exposure to physical risks and the likely financial impacts under various climate scenarios.</li> <li>This information could enable better assessment of the investments needed to increase the resilience of its supply chains and engage strategically with suppliers in high climate risk areas.</li> </ul>
Contribution to Transition	<p><b>Consider setting short- and long-term targets to phase out products and services which are not aligned with the low-carbon transition.</b></p> <ul style="list-style-type: none"> <li>The company could assess what its climate targets would mean for its products and services and consider setting short- and long-term targets to ensure that products and services not aligned with the low-carbon transition are phased out.</li> </ul>

# Dr. Reddy's Laboratories Limited

**Headquarters:** Hyderabad, Telangana, India

**Sector:** Pharmaceuticals, Biotechnology and Life

About the company: Established in 1984, Dr. Reddy's Laboratories Limited (Dr. Reddy's) is an Indian multinational pharmaceutical company that manufactures and markets pharmaceuticals in major markets across 65 countries including India, USA, Russia, and Europe. The company is structured around three global businesses (i) Global Generics (GG), (ii) Pharmaceutical Services and Active Ingredients (PSAI) and (iii) Proprietary products & others. Dr. Reddy's portfolio of products and services include APIs, custom pharmaceutical services, generics, biosimilars and differentiated formulations.

**Analysis: Dr. Reddy's potentially falls under the B-List classification upon applying the CCIF and Carbon Trust's scoring methodology.**

Dr. Reddy's has made significant efforts that align to the "Climate Adaptation" objectives of the AIB-Amundi Climate Change Investment Framework and can further their existing efforts to align to the "Climate Mitigation" objective by updating their Science-based targets to the latest ambition. While pharmaceutical companies have challenges in meeting "Contribution to Transition" objectives, Dr. Reddy's can continue investing in technological innovations to help reduce emissions in their direct operations and supply chain.

## Context for pharmaceutical sector:

- The pharmaceutical sector is one of the fastest-growing sectors in India. The country is one of the leading suppliers of generic drugs and ranks as the third largest producer of active pharmaceutical ingredients (API) in the global market.<sup>10</sup> Pharmaceutical companies in India have started looking into incorporating sustainability into their core business strategy before the onset of the pandemic and while the pandemic response had some impact on progress, the sector still recognises the urgent need for climate action.<sup>11</sup>
- The industry struggles with several challenges to address climate change, the majority of which relate to procurement and development.<sup>12</sup> Pharmaceutical products undergo significantly stringent R&D stages for new products. The costly retesting and new regulatory approval present barriers to then change the components, packaging, and delivery model of pharmaceutical products.

Paris Agreement Objective	Dr. Reddy's: Current Climate Actions
Climate Change Mitigation	<p><b>Set a near term target aligned with the SBTi's target-setting criteria.</b></p> <ul style="list-style-type: none"> <li>• On top of reporting its annual greenhouse gas emissions for Scope 1, Scope 2 and Scope 3, Dr. Reddy's is one of the first Indian pharmaceutical companies to have approved science-based GHG emission targets. The targets set are aligned with a well-below 2-degree Celsius ambition.</li> <li>• Dr. Reddy's commits to reduce scope 1 and 2 GHG emissions by 50.2% per million USD revenue by FY2031 and reduce scope 3 absolute GHG emissions by 12.5% within the same timeframe.</li> <li>• It aims to achieve carbon neutrality in direct operations (Scope 1 and 2) by 2030.</li> </ul> <p><b>Implemented renewable energy and energy efficiency initiatives to reduce their overall energy consumption.</b></p> <ul style="list-style-type: none"> <li>• The company aims to achieve RE100 by 2030.</li> <li>• Close to 30% of Dr. Reddy's power consumption was generated through solar energy in FY2022. The company has also set an aim to procure renewable power for at least 50% of their electricity consumption by FY2025.</li> <li>• Dr. Reddy's has phased out high-carbon fuels in some of their operations and moved towards br iquette-based boilers.</li> </ul> <p><b>Embedded circular economy considerations into the waste generated in their direct operations and working on post-consumer plastic waste recycling.</b></p> <ul style="list-style-type: none"> <li>• 100% of non-hazardous waste in FY2022 was upcycled as fuel for cement factories. All of Dr. Reddy's manufacturing facilities in India achieved zero waste to landfill in FY2022 and 99% of global hazardous waste was sent to cement industries and recyclers for co-processing and recycling.</li> <li>• In FY2021, 1270.5 metric tons of post-consumer plastic waste was collected back for upcycling and recycling in India. Dr. Reddy's aims to achieve 100% waste neutrality (including plastic waste) in India by 2025.</li> </ul>
Climate Change Adaptation	<p><b>Conducted detailed climate risk and opportunities analysis that covers their plants critical suppliers and analysed the potential financial impacts.</b></p> <ul style="list-style-type: none"> <li>• Dr. Reddy's performed a climate risk analysis using recommendations from the TCFD. The risks and opportunities with its associated financial impacts were studied.</li> <li>• Increased water consumption and constrained water supply are among the most critical risks identified. To mitigate water security risk, Dr. Reddy's continues to undertake water conservation initiatives in line with the target to achieve 100% water positive goal by 2025.</li> <li>• Dr. Reddy's evaluated ICP to estimate the impact to future investments and to help them prioritize emission reduction projects that have clear financial advantage.</li> </ul>

## Challenges and key learnings

**1.** Setting a clear carbon emissions reduction strategy aligned with Science-Based Target and publicly disclosing carbon emission performance and strategy.

The company has set aggressive targets for achieving water neutrality and claims to be the only Indian pharmaceutical company to have set carbon emission targets for Scope 1 and 2 based on the SBTi. Dr. Reddy's operational initiatives are well integrated with its sustainability goals and address reduction in raw material consumption, and conservation and reduction in energy and water usage. The company is publicly disclosing its carbon emissions performance and strategy through several CDP reports, scoring "B" in Climate Strategy, "A" in CDP-SC (supply chain) disclosure, and "A-" in Water Security in FY2021.

**2.** Making water pricing a core factor across business and investment decisions.

As a company operating in the pharmaceutical sector, Dr. Reddy's operations are highly vulnerable to climate change and unpredictable weather events necessitating resilience planning. The company is highly dependent on raw materials like water. They devised an internal water pricing mechanism to promote resource efficiency and establish a lower carbon footprint through the responsible use of water. This internal pricing system has become part of all major activities from FY2021.

**3.** Reduce emissions from logistics and distribution chains and invest in climate resilience.

To address greenhouse gas emissions and improve climate resilience, the pharmaceutical industry can prioritise emissions reduction from logistics and distribution as well as responsible waste management linked to packaging materials for products. Investment in sites' resilience is also key to preparing for extreme weather and patching vulnerabilities which could close plants, such as flood barricades, emergency power generators, and keeping critical digital infrastructure on higher floors.

Paris Agreement Objective	Dr. Reddy's: Future Climate Plans
Contribution to Transition	<p><b>Investing into new and innovative technologies to address technology disruption risks.</b></p> <ul style="list-style-type: none"> <li>According to Dr. Reddy's FY2020-21 Sustainability Report, technology disruptions is one of the emerging risks identified that will have the most significant impact to its business. To address this risk, Dr. Reddy's plans to invest in new and innovative technologies in renewables and energy efficiency, electricity storage, green chemistry, and other digital advances in the pharmaceutical sector.</li> <li>Dr. Reddy's initiated lifecycle analysis for some of their products, with special emphasis given to improving the efficiency of solvents, which is the primary raw material. Through investing into green chemistry studies, Dr. Reddy's aims to reduce or replace hazardous solvents with greener solvents.</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Commit to a 1.5-degree target, and set long term science-based target and net zero target date</b></p> <ul style="list-style-type: none"> <li>In July 2021, the SBTi has raised the minimum climate ambition in corporate reduction target setting to align with 1.5-degree above pre-industrial levels. Leaders across the healthcare industries have set a 1.5 degree near term targets, and several have also committed to setting a longer-term net zero target.</li> </ul> <p><b>Engage value chain partners more to enable deeper Scope 3 target setting and develop a time-bound implementation plan</b></p> <ul style="list-style-type: none"> <li>Dr. Reddy's can further engage with value chain partners to on scope 3 emissions reduction target setting, especially in transitioning to electrified transport with its logistics partners and formulate a time-bound implementation plan to track progress.</li> </ul>
Contribution to Transition	<p><b>Measure energy savings and carbon emission reduction arising from low-carbon investments</b></p> <ul style="list-style-type: none"> <li>Quantifying the reduction in GHG emissions from low-carbon innovations like green solvents is an important next step in giving stakeholders visibility to how Dr. Reddy's is reducing its overall GHG emissions.</li> </ul>

# ICT Company (Anonymised)

**Headquarters:** China

**Sector:** Information and communications technology (ICT)

About the company: The company is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. They have nearly 200,000 employees and operate in over 170 countries and regions, serving more than three billion people around the world. Through open collaboration and innovation, they establish industry and ecosystem alliances, support global open-source projects, and drive breakthroughs in key technologies.

**Analysis: The company potentially falls under the B-List classification upon applying the CCIF and Carbon Trust’s scoring methodology.**

The company has made notable efforts to align to all three objectives (“Climate Mitigation”, “Climate Adaptation” and “Contribution to the Transition”) of the AIB-Amundi Climate Change Investment Framework. The Carbon Trust noted the need for more efforts on Climate Mitigation and Adaptation indicators.

**Context for ICT sector:**

- The ICT sector’s carbon emissions are set to continue growing beyond 2025, where peak emissions are expected for sectors such as steel, non-ferrous metal, and cement. A 2021 report by Greenpeace East Asia found that electricity consumption from data centres and 5G base stations in China is set to rise by approximately 289% between 2020 and 2035.<sup>13</sup> The report also predicted that by 2035, emissions from digital infrastructure in China are expected to reach 310 million tonnes.<sup>14</sup>
- The ICT sector needs to take active steps towards decarbonization to support China’s ambition of peaking carbon emissions before 2030 and attain carbon neutrality before 2060. This could be achieved for instance, by powering data centres via renewable energy sources and optimising energy use in their products and services through smart technologies.

Paris Agreement Objective	ICT Company: Current Climate Actions
<p><b>Climate Change Mitigation</b></p>	<p><b>Measured and set carbon emission target covering Scope 1 and 2<sup>15</sup> for 2020.</b></p> <ul style="list-style-type: none"> <li>• Measured and disclosed its Scope 1 and Scope 2 emissions (t-CO<sub>2</sub>e) in 2020 in its 2020 Sustainability Report. Bureau Veritas provided independent assurance of the Sustainability Report.</li> <li>• In 2016, it established a Scope 1 and Scope 2 carbon emission intensity target for 2020 pertaining to reducing carbon emissions per million RMB of sales revenue by 30% compared to 2012 (the base year) and exceeded this target.</li> </ul> <p><b>Adopts renewable energy sources in its operations and is in the process of transitioning to all electric vehicles.</b></p> <ul style="list-style-type: none"> <li>• The company built PV plants at three of its campuses. It has publicly disclosed that electricity usage from renewable energy sources reduced 188,000 tons pf CO<sub>2</sub> equivalent emissions.</li> <li>• Integrating ICT with PV technologies so that solar power can be generated more efficiently.</li> </ul> <p><b>Encouraged suppliers to reduce carbon emissions.</b></p> <ul style="list-style-type: none"> <li>• The company has incorporated sustainability requirements into its end-to-end procurement process. This ranges from supplier admission and qualification to selection, performance evaluation, and portfolio management into its procurement strategy and processes.</li> <li>• In 2020, the company encouraged its top suppliers to calculate their carbon emissions, set carbon emission reduction targets, develop plans, and implement programmes. within a year, all had measured their carbon emissions and &gt;90% of these suppliers had established emissions reduction targets and were implementing initiatives to reduce their emissions. The company has also publicly disclosed the carbon emission reductions by its suppliers between 2019 – 2020.</li> </ul> <p><b>Embeds circular economy concepts in its direct operations and supply chains.</b></p> <ul style="list-style-type: none"> <li>• Sources renewable materials, including recycled aluminium, tin, gold cobalt, for use in manufacturing and is exploring the possibility of encouraging suppliers to use high-quality renewable materials and reduce their reliance on the mining of minerals.</li> <li>• Built a global recycling program for device products and scaled up their product trade-in program and had processed 4,500 tons of smart device e-waste by the end of 2020.</li> </ul>
<p><b>Climate Change Adaptation</b></p>	<p><b>Considers climate related hazards prior to building a campus.</b></p> <p>This is managed by the administration department who considers climate related hazards as a key criterion for their choice of location to build a campus.</p>

## Challenges and key learnings

**1.** Lack of clear methodology and criteria to define green technologies can hamper companies' assessment of their contribution to the low-carbon transition.

As the ICT industry is an enabling industry, their contribution to low-carbon transition is dependent on whether their products are used in technologies classified as "green". The absence of clear methodology and criteria to define green technologies present challenges for ICT companies to track the volume of green technologies used in their operations. Supply chain issues also complicate this determination. Additionally, transition targets, pathways and metrics do not exist for all sectors and the SBTi is one of the few organisations which have examined the transition pathways for the ICT sector.<sup>16</sup> Further work is needed to increase knowledge and best practices for the ICT sector to assess and scale up their contribution to the low-carbon transition.

**2.** Establishing a structured supplier engagement programme can support reducing carbon emissions across the supply chains.

The company incorporates environmental criteria into its procurement strategy and processes, ranging from supplier qualification, selection, review, performance management, and in selection of materials. Besides encouraging its top 100 suppliers to calculate their carbon emissions, set carbon emission reduction targets, develop plans, and implement programmes, it conducts environmental internal audit on suppliers and tracks their performance using an evaluation scorecard. As the supplier's score affects their share in the company's procurement, this creates a financial incentive for suppliers to prioritise decarbonisation efforts and align with the company's environmental criteria.

**3.** Innovations to realise energy savings in products and services add environmental benefits.

The ICT sector's innovations enable other sectors to achieve power savings and reductions in carbon emissions. This amount of reduction can exceed the emissions reduced directly from the ICT sector. Results from the Company's lifecycle assessment for its network equipment and devices led to a focus on improving the network equipment's energy efficiency and the devices' resource efficiency – both of which are critical steps to the low-carbon transition. One of its energy-saving solution applies intelligent technologies to wireless networks to analyse network co-coverage, enabling power saving across a wider network. As more ICT companies invest in energy-saving innovations, the environmental benefits could be achieved among the users of their products and services as well.

Paris Agreement Objective	ICT Company: Current Climate Actions
Contribution to the Transition	<p><b>Focuses on energy savings in its products and services.</b></p> <ul style="list-style-type: none"> <li>Its lifecycle assessment revealed that for network equipment, the carbon footprint generated in the use phase comprise 80-95% of the total, while for devices, the carbon footprint linked to raw material selection phase makes up 80-95% of the total. Therefore, the company is focusing on improving the network equipment's energy efficiency and the devices' resource efficiency.</li> <li>The company applies intelligent technologies to wireless networks to analyse network co-coverage, enabling power saving across a wider network. It also integrated optical modems and routers into one product to maximize energy savings.</li> <li>In 2020, about 80% of its revenue was generated from low carbon products.</li> </ul> <p><b>Empowers green and low-carbon development of society via continuous digital technology and product innovation.</b></p> <ul style="list-style-type: none"> <li>It contributes to build energy-efficient infrastructure by developing a full range of green ICT infrastructure solutions covering green sites, green networks, and green operations.</li> <li>It integrates digital technologies and power electronics to promote green energy adoption. By the end of 2021, its digital power solutions had helped customers generate 482.9 billion kWh of green electricity.</li> <li>It has been leveraging digital technologies to enable the low carbon transformation of various industries, such as transport energy, and construction parks.</li> </ul>
Paris Agreement Objective	ICT Company: Future Climate Plans
Climate Change Mitigation	<p><b>Setting carbon emissions reduction target for 2025</b></p> <ul style="list-style-type: none"> <li>The company plans to reduce the carbon emissions (Scope 1 and Scope 2 GHG emissions) per unit of sales revenue by 16% by 2025 compared with 2019.</li> <li>The company is considering the possibility to align these targets to the SBTi requirements in the future.</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Publicly commit to and set a science-based target.</b></p> <ul style="list-style-type: none"> <li>The company had set carbon intensity reduction targets and met them. Setting a science-based target not only informs its decarbonisation strategy but also strengthens its existing supplier engagement and set an example for suppliers to emulate.</li> </ul>
Climate Change Adaptation	<p><b>Improve the assessment of its operations' and supply chain's exposure to physical risks.</b></p> <ul style="list-style-type: none"> <li>The company can consider assessing physical climate risks associated with its operations and supply chains by conducting climate scenario analysis. The analysis can cover the higher-end of the warming scenarios and evaluate the potential financial impacts when these risks materialize in the short-, medium- and long-term.</li> <li>This enables the company to invest strategically towards climate resilience and adaptation.</li> </ul>

# Mahindra & Mahindra Ltd. (M&M)

**Headquarters:** Mumbai, India

**Sector:** Autos manufacturer

**About the company:** Mahindra and Mahindra Ltd. is the world's largest producer of tractors and a leading manufacturer of utility vehicles in India. It is the flagship company of one of the largest industrial federations in India – the Mahindra Group – with operations in both rural and urban areas. M&M'S products and services include SUVs, electric vehicles, commercial vehicles, two-wheelers, and tractors that are claimed to be robust and fuel-efficient.

**Analysis: M&M potentially falls under the B-List classification upon applying the CCIF and Carbon Trust's scoring methodology.**

M&M has made notable efforts that align to the "Climate Mitigation" and "Contribution to the Transition" objectives of the AIB- Amundi Climate Change Investment Framework. It has set a Science-Based Target, a Net Zero target and the EP100 (Energy Productivity 100) target. The company has been tracking and disclosing its revenues from investments into green technologies and businesses. The company can, however, improve in its efforts under the "Climate Adaptation" objective by broadening the range of climate scenarios assessed and in turn, the likely financial impacts on its operations and supply chains.

## Context for auto sector:

- The autos industry is a key driver of economic growth, contributing 7.1% to the overall Gross Domestic Product (GDP) and 49% to the manufacturing GDP in India. The Automotive Mission Plan of the Government of India aims to raise the contribution of the automobile sector towards India's GDP to 12% and grow employment generation to 50 million.
- In India, the transport sector is the third largest CO<sub>2</sub> emitting industry, with road transport contributing to more than 90% of the sector's CO<sub>2</sub> emissions.<sup>17</sup> As India's economy develops, vehicle ownership level has increased leading to a rise in emission levels on the road.
- To curb emission levels in India's transport sector, a shift towards hybrid and electric vehicles (EVs) is crucial. Current efforts are underway through three key drivers:
  - The first driver is government intervention to lower the barriers to the adoption of EVs. For instance, a scheme (FAME-II) to promote faster adoption and manufacturing of hybrid and electric vehicles offers upfront incentives on the purchase of EVs and supports the

Paris Agreement Objective	M&M: Current Climate Actions
Climate Change Mitigation	<p><b>Measured and set reduction targets covering emissions in its value chain.</b></p> <ul style="list-style-type: none"> <li>Measured and disclosed its Scope 1, Scope 2 and Scope 3 emissions (tCO<sub>2</sub>e) between 2017 to 2021 through its Sustainability Report 2020-21.</li> <li>The SBTi has approved M&amp;M's near-term well below 2°C target to cut Scope 1 and Scope 2 GHG emissions by 47% per equivalent product units by 2033 from a 2018 base year and to reduce Scope 3 GHG emissions by 30% per sold product unit by 2033 from a 2018 base year. M&amp;M has also committed to a Net Zero target.</li> <li>In line with its SBT emission reduction roadmap, M&amp;M has decided on an emission reduction target of 4.1% year-on-year for the next 15 years. It has also committed to be carbon neutral by 2040 and uses GHG removal offers in the form of sequestration through tree plantation.</li> </ul>
	<p><b>Adopted various measures to double the energy productivity of its operations.</b></p> <ul style="list-style-type: none"> <li>First company in the world to commit to doubling its energy productivity by 2030, signing on to The Climate Group's EP100 programme.<sup>20</sup></li> <li>One of M&amp;M's subsidiaries, Mahindra Heavy Engines Limited (MHEL) also committed to EP100 and achieved a doubling of its energy productivity 21 years ahead of its 2041 target.</li> <li>In the last three years, M&amp;M's facilities were awarded 13 Green Building certifications, for their energy saving efforts.</li> </ul>
	<p><b>Fosters circular economy by minimising the use of materials, reduce the waste generated and promote the continual use of resources.</b></p> <ul style="list-style-type: none"> <li>Leveraging on technology and innovation to find better processes and reduce material consumption. For instance, the use of PU paint for sheet metal through highly durable, solid PU Resin System &amp; Polymer Di-Isocyanate technology results in material saving, cost reduction, product quality improvement as well as a lower carbon footprint.</li> <li>Of the 20 locations across M&amp;M's operations, 14 of them have achieved zero waste to landfill goal. The company established a target to recycle 70% of total hazardous waste generated in FY21 and to cap hazardous disposal to 30%. It also surpassed the hazardous waste disposal to landfill target for FY21, achieving 469 MT waste disposal against the target of 1,025 MT for FY21.</li> <li>M&amp;M runs Cero Recycling, a Joint Venture between Mahindra Accelo and MSTC (A Government of India Enterprise) to purchase scrap cars from individuals and institutions and recycle them at its facility in Greater Noida.</li> </ul>

deployment of charging infrastructure. While the scheme disbursed just under 10% of the targeted amount in November 2021, it has improved significantly since June 2021 as the subsidies given per two-wheeler were doubled.<sup>18</sup>

**2.** The second driver is the improvements in battery chemistry resulting in lower costs of battery production. This contributes to lower prices of electric vehicles which increases consumers' appeal for electric vehicles.

**3.** The third driver is the shift in business models towards a "full stack approach". From a previously vertical-focused approach, with emphasis on

manufacturing and marketing of the vehicle, companies are now going beyond to include direct sales to consumers, set up of charging infrastructure and offering financing options.<sup>19</sup> These range of services lower the barriers for EV adoption, and may contribute towards achieving critical mass for EVs in India.

## Challenges and key learnings

**1.** Setting SBTs covering its Scope 1, Scope 2 and Scope 3 emissions and committing to a net zero target ensures that the company has made a credible commitment on its climate initiatives across its entire business.

Autos is an energy-intensive industry and its business operations are vulnerable to risks associated with seasonal monsoon, rising energy costs, uncertain access to raw materials as well as changing consumers' tastes and preferences. M&M has disclosed SBTi-approved targets to cut Scope 1, Scope 2, and Scope 3 GHG emissions which are consistent with reductions required to keep warming to well-below 2°C. This allows the company to assess the progress of its climate initiatives and communicate credibly to external stakeholders. According to the SBTi website, M&M has also committed to a net zero target.

**2.** Quantifying contribution to the transition by establishing an ICP and monitoring revenues from and investments into green technologies.

In 2016, M&M became the first Indian company to announce an ICP of USD10 per ton of carbon emitted. Pricing carbon can be an important tool for businesses to reduce not only their carbon footprint but also address the risks arising from tightening government regulations on GHG emissions. In M&M's case, the funds raised are then invested in renewable energy, including solar, wind, heat recovery systems, and energy efficient motors. The company tracks its revenues from and investments into green technologies. This is essential not only to facilitate the low-carbon transition but also to remain competitive in the Indian market as electric mobility becomes more prominent.

Paris Agreement Objective	M&M: Current Climate Actions
Climate Change Mitigation	<p><b>Maintains sustainable supply chain management and procurement policies.</b></p> <ul style="list-style-type: none"> <li>Regularly evaluates the sustainability of existing technology of their suppliers and conducts environmental and social assessment using its internal balance scorecard.</li> <li>Partnered with the Institute for Sustainable Communities &amp; Symbiosis Institute to train 3,873 suppliers. 14 suppliers had implemented energy projects, achieving 1,912 tons of CO<sub>2</sub> savings.</li> </ul>
Climate Change Mitigation & Contribution to the Transition	<p><b>Introduced an internal carbon price (ICP) which helps to direct investments towards greener projects.</b></p> <ul style="list-style-type: none"> <li>First Indian company to introduce an ICP of USD10 per ton of carbon emitted. The funds raised are then invested in renewable energy, including solar, wind, heat recovery systems, and energy efficient motors.</li> </ul>
Climate Change Adaptation	<p><b>Assessed the physical risks and transition risks related to its direct operations and supply chain.</b></p> <ul style="list-style-type: none"> <li>The physical risks identified include abundant rainfall, flooding, and drought risks. The company also considered transition risks arising from government regulations as well as new products and technologies.</li> <li>The COVID-19 pandemic has also influenced consumers' preferences, opting for personal vehicles over shared mobility arrangements.</li> </ul>
Contribution to the Transition	<p><b>Invests in green technologies to drive transition, tracks its investment contributions and the revenue generated from these investments</b></p> <ul style="list-style-type: none"> <li>M&amp;M invested approximately INR320m (USD4m) in energy efficiency improvement and renewable energy technologies.</li> <li>M&amp;M is the parent company of subsidiaries with specific green businesses such as Mahindra Lifespaces, Mahindra Electric Mobility Limited, Mahindra Susten and Mahindra EPC. These green businesses generate green revenues estimated at USD600m (3-4% of the Group's total revenue).</li> </ul>



**3. Deploying ultra-low emission vehicles** require robust charging infrastructure.

At the country level, there is limited access to robust charging infrastructure and high carbon grid profile making it challenging for the deployment of EVs. Nonetheless, M&M is pioneering ahead with the EV technology and is working with the Government of India under the FAME-II scheme to invest in growing the adoption of EV on Indian roads. M&M has also partnered with Amazon India to fulfil its target to have 10,000 EVs in its delivery fleet by 2025.

Paris Agreement Objective	M&M: Future Climate Plans
Climate Change Mitigation	<p><b>Shift its directly contracted logistic transport to hybrid vehicles and eventually electric vehicles.</b></p> <ul style="list-style-type: none"> <li>By 2030, M&amp;M is looking to trial ultra-low emission vehicles for 30% of its total fleet.</li> </ul>
	<p><b>Plans to boost its green energy ratio through increasing solar and wind power capacities.</b></p> <ul style="list-style-type: none"> <li>The share of renewable electricity of M&amp;M has increased to 12.3% in F22 compared to 9% in F21. M&amp;M plans to increase solar and wind power capacities to boost its green energy ratio.</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Establish a higher target to grow the share of solar and wind power capacities as well as diversify into other types of renewable energy sources.</b></p> <ul style="list-style-type: none"> <li>To increase the proportion of renewable energy in its total energy mix beyond solar and wind power, M&amp;M could also explore tapping into other sources such as green hydrogen in the near future where viable.</li> </ul>
Climate Change Adaptation	<p><b>Enhance its scenario analysis to include 3°C and 4°C scenarios to assess the magnitude of the financial impacts to the company in extreme conditions.</b></p> <ul style="list-style-type: none"> <li>According to its Climate Change 2021 CDP questionnaire response, M&amp;M implemented a scenario planning exercise and considered four different scenarios in a maximum 2-degree warmer world.</li> <li>Expanding the analysis to include 3°C and 4°C scenarios can deepen M&amp;M's understanding of the potential financial impacts and in turn, allocate appropriate budgets in the future to make infrastructural changes to align with climate related hazards.</li> </ul>
Climate Change Adaptation	<p><b>Enhance its scenario analysis to include 3°C and 4°C scenarios to assess the magnitude of the financial impacts to the company in extreme conditions.</b></p> <ul style="list-style-type: none"> <li>According to its Climate Change 2021 CDP questionnaire response, M&amp;M implemented a scenario planning exercise and considered four different scenarios in a maximum 2-degree warmer world.</li> <li>Expanding the analysis to include 3°C and 4°C scenarios can deepen M&amp;M's understanding of the potential financial impacts and in turn, allocate appropriate budgets in the future to make infrastructural changes to align with climate related hazards.</li> </ul>

# Samsung SDI Co., Ltd.

**Headquarters:** South Korea

**Sector:** Technology & Electronics

About the company: Samsung SDI, a subsidiary of Samsung Group, is the global leader in the manufacturing of energy storage and electronic materials technology. Established in 1970, the company operates in 27 countries and is a leading supplier of Lithium-ion battery, which is the current most widely adopted energy storage technology. Its rechargeable Li-ion batteries are used commercially in consumer electronics, low-carbon automotives and Energy Storage Systems (ESS). The company endeavours into the R&D of solid-state batteries technology as well. Besides energy storage solutions, Samsung SDI manufactures materials for semiconductor manufacturing as well as OLED and LCD display screens.

**Analysis: Samsung SDI potentially falls under the B-List classification upon applying the CCIF and Carbon Trust's scoring methodology.**

The company has made significant efforts related to the "Climate Adaptation" and "Contribution to Transition" objectives of the AIB-Amundi Climate Change Investment Framework. Samsung SDI has measured and reported its organizational and value chain emissions and can consider taking a step further to set science-based targets aligned to 1.5-degree ambition to improve its "Climate Mitigation" efforts.

## Context for technology & electronics sector:

South Korea has one of the biggest technology players in the global market, manufacturing both the software and hardware. The country is a major global exporter of electronics products to US, China, and EU markets<sup>21</sup> and it is positioned as one of the world's leading technologies innovators.

The electronics sector in South Korea will continue to grow at a rapid pace strengthened by export demand for electronics products in fast-growing emerging markets like China, India, and ASEAN countries. However, research has reported that the huge demand for Korean electronics has led to a contribution of 8% of national greenhouse gas (GHG) emissions in 2017<sup>22</sup>. To meet Korea's goal of achieving carbon neutrality by 2050, large conglomerates like Samsung SDI must contribute and commit to substantially cut their emissions in the next decades.

For the battery industry, the South Korean government announced the development plan in 2021 to drive innovation and accelerate growth of the industry.

Paris Agreement Objective	Samsung SDI: Current Climate Actions
<p><b>Climate Change Mitigation</b></p>	<p><b>Measured, reported, and set targets around its organizational greenhouse gas emissions.</b></p> <ul style="list-style-type: none"> <li>Measured and disclosed its Scope 1, Scope 2, and selected Scope 3 categories GHG emissions (tCO<sub>2</sub>e) in 2021 in its 2021 ESG Report. For Scope 3, only selected categories related to business travel, product transportation, fuel energy and waste were reported.</li> <li>Set a target to reduce direct GHG emissions by 340,000 tCO<sub>2</sub>e by improving LNG use intensity.</li> </ul> <p><b>Committed to achieve 100% renewable energy by 2050.</b></p> <p>Set a goal to achieve 100% transition to renewable energy for all its operations globally by 2050 and created a roadmap for renewable energy adoption leading up to 2050.</p> <ul style="list-style-type: none"> <li>The company plans to steadily increase their renewable energy portfolio from 42% in 2025, 65% in 2030 and eventually to 100% in 2050, through PPAs and purchase of renewable energy certificates (REC).</li> </ul> <p><b>Embeds circular economy concepts in its direct operations.</b></p> <ul style="list-style-type: none"> <li>Works with service providers to recycle scraps from its manufacturing process. These scraps are recycled into nickel sulphate and cobalt sulphate which is then fed back into the process as raw materials.</li> <li>On top of driving waste reduction in their operations, the company has taken a step further to set a waste recycling ratio of 80% amount recycled versus amount discharged by 2025.</li> </ul>
<p><b>Climate Change Adaptation</b></p>	<p><b>Identified and reported physical and transitional climate risks in direct operations and supply chain as well as its associated financial impacts.</b></p> <ul style="list-style-type: none"> <li>In accordance with the TCFD framework, Samsung SDI identified both physical and transition climate-related risks to their business. Based on the 2021 CDP report submitted, the company has also analysed the associated financial impacts to the risks identified.</li> <li>Introduced internal carbon pricing system to forecast cost of annual emissions, to set aside potential budget needed and to expand efforts in lowering the risks through renewable energy deployment.</li> </ul>
<p><b>Contribution to the Transition</b></p>	<p><b>Conducts R&amp;D on new eco-friendly and market-leading products.</b></p> <ul style="list-style-type: none"> <li>The company is driving R&amp;D for all-solid-state batteries and cobalt-free batteries. A potential successor to Li-ion batteries, all-solid-state batteries has better performance as it can store more energy and is fast charging. The technology is a potential game changer which will help to drive the widespread adoption of EVs. Furthermore, solid-state batteries have better environmental performance, requiring fewer raw materials and can be produced without mined cobalt for raw material<sup>23</sup>. Cobalt-free batteries are eco-friendly and price competitive as well, which helps companies mitigate its raw material supply risks.</li> <li>Samsung SDI has also conducted an internal life cycle assessment for its EV batteries to analyse its environmental impacts and conduct further R&amp;D to determine areas to lower emissions in the entire life cycle of its products.</li> </ul>

## Challenges and key learnings

**1.** Investments into research and development for more efficient, lower carbon technology helps company remain competitive.

In the face of rising demand for eco-friendly products, Samsung SDI recognised the need to research new applications and technology which enables better environmental performance. The company invests in the R&D of new market-leading products like solid-state batteries. This helps to keep company competitive and reduce risks of stranded assets due to green alternatives. The company's investment on innovation can in turn drive widespread adoption of electric vehicles and enable avoided emissions when consumers make the switch to a lower carbon vehicle.

**2.** Conduct product life cycle assessments to identify scale of environmental impacts from production to disposal.

Life cycle assessments identify greenhouse gas emissions throughout a product's life cycle from extraction of raw materials to product use and disposal. It is an important tool that can help companies determine areas of improvement in their production processes. In Samsung SDI's case, the company will adopt an extended cradle-to-grave life cycle assessment for its EV batteries, instead of a cradle-to-gate approach. The cradle-to-grave methodology helps the company broaden its scope of environmental impact assessment into the end-of-life treatment of batteries, aiding Samsung SDI in strategic planning of measures to reduce its emissions.

**3.** Technology & electronics manufacturing companies are prone to physical climate risks as processes are sensitive to temperature and humidity changes.

The manufacturing of electronics products typically take place in highly controlled environment with steady temperature and humidity. Rise in frequency of extreme weather conditions due to climate change can cause an increase in operational costs to keep the production facility at the same condition. It is important for companies to analyse the associated financial impacts of the climate risks through the TCFD framework so they can set aside sufficient budget in the coming years in the event of a climate incident.

Paris Agreement Objective	Samsung SDI: Future Climate Plans
Climate Change Mitigation	<p><b>Plans to work with automotive Original Equipment Manufacturers (OEMs) to develop a closed-loop resource recovery system for end-of-life batteries.</b></p> <ul style="list-style-type: none"> <li>Samsung SDI is conducting research and development on the possibility to reuse its end-of-service EV and ESS batteries for other applications.</li> </ul>
	<p><b>Aims to switch to zero-emission cars for owned or leased business vehicles and build corresponding charging infrastructure by 2030</b></p> <ul style="list-style-type: none"> <li>Samsung SDI installed EV chargers and introduced EV buses in a few of their worksites in South Korea.</li> <li>Joined K-EV100 led by South Korea's Ministry of Environment to commit to a shift to EVs.</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Measure entire Scope 3 value chain footprint.</b></p> <ul style="list-style-type: none"> <li>Samsung SDI made efforts in the calculation and verification of Scope 3 footprint in selected categories of product transportation, fuel energy and waste. Their suppliers are also encouraged to report their own Scope 1 and 2 footprints, which Samsung SDI has used to report some of its Scope 3 categories in the 2021 CDP report.</li> <li>It is useful for the company to conduct a complete audit of Scope 3 footprint to identify hotspots and develop a targeted emission reduction strategy.</li> </ul>
	<p><b>Publicly commit to set near-term and long-term science-based targets.</b></p> <ul style="list-style-type: none"> <li>Once the full value chain footprint is calculated, the next step is to commit and set a near-term and long-term science-based target, which not only informs the public about its decarbonisation strategy but also strengthens its existing supplier engagement on climate action.</li> </ul>

# Singapore Telecommunications Limited (Singtel)

**Headquarters:** Singapore

**Sector:** Telecommunications

**About the company<sup>24</sup>:** Singtel is Asia's leading communications technology group, providing a portfolio of services from next-generation communication, technology services to infotainment to both consumers and businesses. For consumers, Singtel provides integrated suite of services, including mobile, broadband and TV. Singtel also provides workforce mobility solutions, data hosting, cloud, network infrastructure, analytics, and cyber-security capabilities to businesses. The Group has presence in Asia, Australia and Africa and reaches over 740 million mobile customers in 21 countries. Its infrastructure and technology services for businesses span 21 countries, with more than 428 direct points of presence in 362 cities.

**Analysis: Singtel potentially falls under the A-List classification upon applying the CCIF and Carbon Trust's scoring methodology.**

Singtel has demonstrated strong efforts across "Climate Mitigation", "Climate Adaptation" and "Contribution to the Transition" of the AIIB-Amundi Climate Change Investment Framework. The Carbon Trust recommends the company to assess its exposure to physical climate risks and potential financial impacts across the value chain. These will help to better measure and assess the company's contribution to the transition.

**Context for telecom sector:**

Singapore has ambitions to transform into a "smart nation". The Smart Nation strategy was launched in 2014 and the country has positioned itself as a living test bed where companies can develop and promote innovative urban solutions in cooperation with the Singapore government<sup>25</sup>.

The high digital penetration in Singapore together with the rising emphasis on digital solutions pave the way for the telecom sector to grow in importance in both the economy and the environment. On the other hand, data centres account for a significant proportion of energy consumption while the products and services offered by telecom companies could lead to more waste and pollution to the natural environment, including those linked to e-waste.

Paris Agreement Objective	Singtel: Current Climate Actions
<p><b>Climate Change Mitigation</b></p>	<p><b>Established a Science Based Target in 2017 to reduce Scope 1 and 2 emissions by 42 percent and Scope 3 emissions by 30 percent between 2015 and 2030<sup>26</sup>.</b></p> <ul style="list-style-type: none"> <li>Developed carbon reduction goals aligned with science-based targets methodology, and its carbon reduction targets were approved by the Science Based Targets initiative in 2017 in line with a well-below 2-degree scenario.</li> <li>Singtel has consistently reported its total carbon emissions (tonnes of CO<sub>2</sub> equivalent) in terms of Scope 1, 2 and 3, which are independently verified by Ernst &amp; Young LLP since the 2017 Sustainability Report.</li> <li>Its decarbonisation roadmap includes renewable energy adoption in its Singapore and Australian operations, in addition to ongoing initiatives to upgrade mobile networks and phase out energy inefficient types of equipment and facilities.</li> </ul> <p><b>Implemented product stewardship.</b></p> <ul style="list-style-type: none"> <li>Partnership with Mobile Muster since 1998 to facilitate the recycling of mobile devices and accessories via its Optus stores.</li> <li>Developed an internal Sustainable Packaging Strategy with goals aligned with Australia's National Packaging Waste targets to make all packaging 100 percent reusable, recyclable or compostable in Australia by 2025.</li> </ul>
<p><b>Climate Change Adaption</b></p>	<p><b>Identified both chronic and acute risks<sup>27</sup> to its direct operations and supply chains and developed adaptation measures.</b></p> <ul style="list-style-type: none"> <li>Assessed these risks through climate scenario analysis for its Singapore and Australian operations back in FY 2016.</li> <li>Conducted a pilot in Northern Rivers region, New South Wales, Australia to refine the modelling and validate the material drivers and assumptions that have an impact on the company's financials. The pilot exercise found that forest fires are expected to have the highest financial impact on capital expenditure for asset repair or replacement in 2030 and 2050.</li> <li>Implemented different adaptation measures such as back-up generators in Australia with the capacity to provide support up to six-seven days independent of the general grid as well as Cell-sites on Wheels (COWs) mobile base stations and Community Trucks in the event of bush fires and floods to support connectivity for the local communities.</li> </ul>
<p><b>Contribution to the Transition</b></p>	<p><b>Provide telecom services and greater connectivity which are enablers of the low-carbon transition.</b></p> <ul style="list-style-type: none"> <li>Singtel's network, ICT services, and solutions enable its corporate customers to telecommute and maintain productivity, while lowering carbon emissions from reduced transportation.</li> <li>Its largest source of revenue related to green technology can be attributed to its data centres. Besides regular upgrades and use of energy efficient technologies for existing data centres, new data centres are certified to the highest prevailing Singapore standards known as Greenmark Platinum. Older less efficient data centres are progressively retired. Its 5G networks are reportedly more energy efficient per unit of data traffic compared to legacy technologies.</li> </ul>

## Challenges and key learnings

**1.** The growing demand for energy could be alleviated through more energy efficiency measures especially when there are some challenges in increasing procurement of renewable energy in Singapore.

Singtel faced substantial challenges increasing procurement of renewable energy in Singapore where local renewable energy supply is limited. The growing demand for energy could be alleviated through energy efficiency measures such as regular upgrades and use of energy efficient technologies for existing data centres and certifying new data centres to the highest prevailing Singapore standards known as Greenmark Platinum. The deployment of 5G networks – compared to legacy technologies – also contributes to higher energy efficiency.

**2.** Setting science-based targets which cover both direct operations and supply chains.

Setting ambitious, credible, and science-based targets is important to communicate the direction of the company as well as to better align future climate action. Singtel's efforts to achieve its SBT will have ripple effects by shaping the way it operates and the suppliers it engages, as well as form the basis of sustainability linked financing performance targets.

**3.** Promoting best practices through industry associations.

Through its role on the GSMA<sup>28</sup> Board and its Climate Action Task Force, Singtel has helped to shape the industry in embarking on a landmark science-based sector-specific decarbonisation pathway to reduce GHG emissions and achieve net zero emissions by 2050. Moving forward, industry associations can also promote regular dialogues with policymakers to raise awareness around the latest developments in topics such as energy efficiency standards. This can inform and spur more telecom companies to adopt the most advanced technologies and better address transition risks.

**4.** Diversifying into green and sustainable financing options.

Drawing on Singtel's experience with SLBs, telecom companies can consider tapping into the green and sustainable financing options in the market. This not only helps companies to diversify their sources of financing but also enables the company to better achieve its climate goals in the long run.

<b>Paris Agreement Objective</b>	<b>Singtel: Current Climate Actions</b>
<b>Contribution to the Transition</b>	<p><b>Released its Sustainability-Linked Bond Framework, which is a first for a telecom company in Asia Pacific.</b></p> <ul style="list-style-type: none"> <li>Under this framework, Singtel and Optus may issue sustainability-linked bonds (SLB) linked to the achievement of GHG reduction that align with targets approved by the SBTi.</li> <li>Optus, through its wholly owned subsidiary, Optus Finance, has issued an AUD300m seven-year fixed-rate SLB in November 2021</li> </ul>
<b>Paris Agreement Objective</b>	<b>Singtel: Future Climate Plans</b>
<b>Climate Change Mitigation</b>	<p><b>Increase procurement of renewable energy for its operations.</b></p> <ul style="list-style-type: none"> <li>This is a key step to reduce its exposure to extreme policy shock, assessed to be its most material source of transition risk. Singtel is also planning to complete an internal carbon pricing project in FY 22 to better understand carbon tax policy scenarios and implications.</li> <li>Interim target: to achieve 25 percent renewable energy by end 2025 for its Scope 2 needs in Singapore and Australia.</li> <li>Has set one, three and five-year carbon and renewable energy targets to shape its renewable energy PPA tenders to be issued to market in FY 2022.</li> </ul>
<b>Paris Agreement Objective</b>	<b>Carbon Trust's Recommendations</b>
<b>Climate Change Adaptation</b>	<p><b>Moving beyond the pilot project to assess physical risks and financial impact on its value chain, key commodities, and distribution routes.</b></p> <ul style="list-style-type: none"> <li>Expanding this assessment to include its value chain, key commodities and distribution routes will allow the company to arrive at a more holistic view of its climate risks exposure and the potential financial impacts.</li> </ul>
<b>Contribution to the Transition</b>	<p><b>Develop metrics for Scope 3 related efforts such as e-waste recycling to better measure and assess the company's contribution to the transition.</b></p> <ul style="list-style-type: none"> <li>Better measurement and disclosure improves accountability to stakeholders.</li> </ul>

# TCL Electronics Holdings Limited

**Headquarters:** China

**Sector:** Electronics

**About the company:** Incorporated in 1999 in China, TCL Electronics Holdings Limited (TCL Electronics) is a consumer electronics company specialising in the R&D, manufacturing and sales of smart screens, mobiles, connected devices, commercial displays, home products and other IoT products. It has over 31,000 employees and operates globally in 58 countries. In China, TCL Electronics is the only company within the industry that has a vertically integrated supply chain. TCL Electronics aspires to become a global leading smart technology company and is actively investing in development of cutting-edge displays, 5G and AI-empowered consumer products.

**Analysis: TCL Electronics potentially falls under the B-List classification upon applying the CCIF and Carbon Trust’s scoring methodology.**

The company’s efforts to design and manufacture greener consumer electronics products is well aligned with the “Contribution to Transition” objective of the AIB-Amundi Climate Change Investment Framework. However, there is room for improvement across the other two objectives. Related to “Climate Mitigation”, TCL Electronics should set science-based targets, and under the “Climate Adaptation” objective, the company should conduct a stronger climate scenario analysis.

**Context for electronics sector:**

- Despite the Covid-19 pandemic, China’s electronics market has maintained a steady growth in the first quarter of 2022 with a 12.7% growth year-on-year<sup>29</sup>. Specifically in the electronics display market, China is the market leader internationally, driven by its dominance in the LCD market<sup>30</sup>.
- Backed by strong demand for digital products and government support, the electronics and ICT sector in China is expected to continue to grow. However, carbon emissions generated from the electronics manufacturing industry is predicted to increase alongside the sector’s growth, which may hinder achieving the country’s goals to peak emissions before 2030 and attain carbon neutrality before 2060. The Chinese government has recognised the need to decarbonise the sector and is planning to establish low-carbon evaluation technology standards for electronic products such as computers and LCD televisions. The plan will also include other standards for carbon emission monitoring and carbon neutrality management systems in the electronics sector<sup>31</sup>.

Paris Agreement Objective	TCL Electronics: Current Climate Actions
<p><b>Climate Change Mitigation</b></p>	<p><b>Measured and reported its Scope 1 and 2 greenhouse gas emissions.</b></p> <ul style="list-style-type: none"> <li>• Measured and disclosed its Scope 1 and Scope 2 greenhouse gas (GHG) emissions (tCO<sub>2</sub>e) in 2021 in its 2021 ESG Report.</li> <li>• Set a GHG emission intensity target (tCO<sub>2</sub>e per RMB10,000 output value) to reduce 18% of Scope 1 and 2 emissions by 2025 from a base year of 2020.</li> </ul> <p><b>Embeds circular economy concepts in its direct operations.</b></p> <ul style="list-style-type: none"> <li>• Selects readily degradable and recyclable materials in product development stage and recycles electronic and packaging waste generated back into its process. If there are remaining waste that cannot be recycled or reused, TCL Electronics will hand over the waste to qualified third parties to carry out recycling treatment.</li> <li>• Built recycling programmes and events globally to encourage users of their electronic goods to trade-in their old TV sets and mobile devices. The company works with partners like its fellow subsidiary TCL Environmental Protection Technology Co. and MRM, a recycling management company, to recycle and reuse the scarce material in these devices.</li> <li>• Requests suppliers to recover and reuse packaging materials like paper carbons, cardboards, and plastic boxes.</li> </ul>
<p><b>Climate Change Adaptation</b></p>	<p><b>Identified physical and transition climate risks and considers climate-related hazards prior to building their facilities.</b></p> <ul style="list-style-type: none"> <li>• TCL Electronics has identified both acute and chronic physical climate-related risks as well as policy and reputational related transition risks. The company has also analysed how these risks would impact its own operations and its supply chain.</li> <li>• According to its 2021 ESG report, the company demonstrated that it has put in place measures to prevent these risks by formulating emergency plans in the event of disasters, upgrading factories through process optimisation and low-carbon practices, and considering climate-related hazards as a key criterion for their choice of location to build facilities.</li> </ul>
<p><b>Contribution to the Transition</b></p>	<p><b>Innovates to achieve energy savings in its products and services.</b></p> <ul style="list-style-type: none"> <li>• The company prioritises low-carbon green design for its products and manufacturing processes. TCL Electronics is the first company in China which had its products, 10 TV models, certified by the Product Carbon Label issued by China Electronic Energy Saving Technology Association.</li> <li>• Aside from the product carbon label, some products manufactured by the company have achieved China’s Energy Efficiency Standard of Level 2 in the China market and an Energy Star Rating of 8.0 in the US Market.</li> <li>• According to its CDP submission, about 66.7% of its revenue is derived from low-carbon products.</li> </ul>

## Challenges and key learnings:

**1.** Innovating energy-efficient products can save costs for companies and reduce emissions in product development processes.

Digital technology is one of the key tools in the fight against climate change as it creates new possibilities for carbon reduction. Innovations in digital products can help to spearhead efforts in global decarbonisation goals. The World Economic Forum has reported that the industry has a potential to cut global greenhouse gas emissions by 15%<sup>32</sup>. The electronics and ICT sectors' innovations enable other sectors to achieve power savings and reductions in carbon emissions. As such, TCL Electronics prioritises investments into low-carbon product design, not only to achieve cost savings, but also to prevent transition risks of assets being stranded. As more electronics and ICT companies invest in energy-saving innovations, the environmental benefits could be achieved among the users of their products and services as well.

**2.** Lack of a clear international standard and methodology to define green consumer electronics and ICT products can hamper companies' assessment of their contribution to the low-carbon transition.

As electronics and ICT are enabling industries, their contribution to low-carbon transition is dependent on whether their products are classified as "green". The absence of clear methodology and criteria to define green technologies present challenges for companies to track the volume of green technologies used in their operations. As such, electronics and ICT companies struggle to assess their exact contribution to the low-carbon transition. One way to overcome this is to adopt the avoided emissions framework to measure and report the enablement impact of each product. This will help companies track how their products are driving carbon reduction and ensure greater stakeholder transparency when companies report their findings.

**3.** Continuous engagement and review with partners in the electronics supply chain is a key to the success of reducing carbon emission in the supply chains.

The electronics and ICT sectors typically have large and complex supply chains, even in TCL Electronics' vertically integrated one. Having a clear supplier review framework and incorporating environmental criteria into the review can influence a greener supply chain and drive reduction in emissions. TCL Electronics adopts a rigorous review of its supply chain through their "Regulations on the Management

Paris Agreement Objective	TCL Electronics: Future Climate Plans
Climate Change Mitigation	<p><b>Evaluating the possibility of aligning its Scope 1 and Scope 2 emissions intensity reduction targets to the requirements of the SBT.</b></p> <ul style="list-style-type: none"> <li>SBT commitments were made by TCL Electronics' subsidiaries, Huizhou TCL Mobile Communication Co. and TCL King Electrical Appliance (Huizhou) Co. in 2021 and 2022 respectively. The company has reviewed its Scope 1 and 2 emissions and is planning to set a 1.5-degree SBT target at the group level.</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Set ambitious targets for renewable energy use.</b></p> <ul style="list-style-type: none"> <li>In line with China's national carbon reduction goals, the company can consider committing to a RE100 target before 2030 and drive reduction in Scope 2 emissions, which makes up 89% of its total Scope 1 and 2 footprints.</li> <li>According to its 2021 ESG report, the share of renewable energy in the total energy mix for TCL Electronics is 8% in 2021. The company can tap on expertise from TCL China Star Optoelectronics Technology (CSOT)'s green technology arm to further improve their renewable energy proportion. TCL CSOT is a subsidiary of TCL Technology, which is TCL Electronics' parent company.</li> </ul> <p><b>Measure Scope 3 value chain footprint and publicly commit to set a science-based target.</b></p> <ul style="list-style-type: none"> <li>Majority of a company's overall GHG emissions typically lies in its Scope 3 value chain footprint. It would be useful for the company to measure and set reduction targets for its Scope 3 footprint so that it could continue to establish itself as a climate action leader in the industry and influence its value chain partners to adopt carbon reduction strategies.</li> <li>The company has already set a carbon intensity reduction target for 2025. The next step forward is to commit to and set a near-term and long-term science-based target which not only informs the public about its decarbonisation strategy which sets an example for suppliers to emulate.</li> </ul> <p><b>Measure and report enablement impact of its "green" products.</b></p> <ul style="list-style-type: none"> <li>The company has made considerable efforts in low-carbon innovation of its products and could explore developing a model to quantify the avoided emissions. This could help the company provide transparent reporting for customer engagement and to identify areas where company can pursue further innovations and deliver greater avoided emissions.</li> </ul>
Climate Change Mitigation & Contribution to Transition	
Climate Change Adaptation	<p><b>Conduct detailed temperature-based assessment of its operations' and supply chain's exposure to physical risks and the associated financial impacts.</b></p> <ul style="list-style-type: none"> <li>The company can consider assessing temperature-based climate related risks and opportunities related to its operations and supply chains, that are aligned to the higher-end of the warming scenarios. It can also evaluate the potential financial impacts when these risks materialize in the short-, medium- and long-term.</li> <li>This would enable the company to invest strategically in climate resilience of its operations and assets.</li> </ul>

of Supplier Review" framework and evaluates its suppliers monthly through a scoring system. As the supplier's score affects their share in the company's

procurement, this creates a financial incentive for suppliers to align with the company's environmental criteria.

# Vena Energy

**Headquarters:** Singapore

**Sector:** Energy (power generation)

**About the company:** Vena Energy is an independent power producer (IPP) of renewable energy. It owns, develops, constructs, operates, manages, and commercialises renewable energy projects in the Asia-Pacific region. Headquartered in Singapore, the company has a presence in Australia, India, Indonesia, Japan, Philippines, South Korea, Taiwan, China, and Thailand. Vena Energy’s portfolio consists of solar, wind and battery energy storage system assets with over 18-gigawatts in operation, construction, contracted, and development stages. Vena Energy is a portfolio company of Global Infrastructure Partners, a leading global independent infrastructure fund manager in the energy, transport, and water/ waste sectors.

**Analysis: Vena Energy potentially falls under the B-List classification upon applying the CCIF and CT’s scoring methodolog**

.Vena Energy has made efforts that align to the “Contribution to Transition” objective of the AIIB-Amundi Climate Change Investment Framework but can improve in efforts aligning to the “Climate Mitigation” and “Climate Adaptation” objectives. A strong science-based target aligned to 1.5 degrees, and deeper financial analysis on climate risks and mitigation would be the important next steps.

**Context for energy sector:**

Although the Asia-Pacific region is a renewable energy leader worldwide, the deployment of renewables continues to lag from that of traditional energy sources due to the economic growth connected with fossil fuels. 85% of the energy use in Asia-Pacific is derived from fossil fuels and the region accounts for 50% of global greenhouse gas emissions<sup>33</sup>. Asia-Pacific is among the most vulnerable to the impacts of climate change<sup>34</sup>. In the face of climate concerns and risks from volatile energy prices due to recent geo-political tensions, countries in the region are recognising that more robust efforts are required to accelerate the transition to renewables.

Hydropower remains the most adopted renewable energy source for Asia Pacific region, making up to 65% of the region’s renewable energy share<sup>35</sup>. Solar and wind are also promising renewable energy sources in driving the energy transition. Governments in the Asia-Pacific region have set renewable adoption targets to help them move closer to achieving their broader Nationally Determined Contributions (NDCs). With these fiscal policies in effect, experts predict that investments in renewable energy generation may double to \$1.3 trillion by 2030 from the previous decade<sup>36</sup>. Power producers like Vena Energy have a huge part to play in driving Asia-Pacific’s renewable transition journey.

Paris Agreement Objective	Vena Energy: Current Climate Actions
Climate Change Mitigation	<p><b>Incorporates climate change performance as one of the KPIs for senior executives.</b></p> <ul style="list-style-type: none"> <li>The volume of clean energy generation and installation performance of new renewable clean capacities are linked to the KPIs of all senior executives. This in turn impacts the remuneration of senior executives.</li> </ul> <p><b>Measured and reported its Scope 1, 2 and 3 emissions.</b><sup>37</sup></p> <ul style="list-style-type: none"> <li>The company measured and reported on its Scope 1, 2 and 3 emissions. For Scope 3 emissions, the company has either tracked or estimated the carbon emissions stemming from manufacturing and transporting renewable energy equipment and components, as well as the emissions from services obtained for day-to-day operations.</li> <li>Most of the company’s Scope 3 emissions come from Category 2 “Capital Goods Purchased” which captured the upstream (cradle-to-gate) emissions from its equipment purchases.</li> <li>Renewable energy generation across project portfolio results in reduction in Scope 1 and Scope 2 emissions, comprising 0.05% and 0.8% of the total GHG emissions avoided respectively.</li> </ul> <p><b>Integrates optimal efficiency and longevity in all stages of the project lifecycle.</b></p> <ul style="list-style-type: none"> <li>Vena Energy recognizes the finite life of its renewable energy projects and the importance of planning for the end-of-service life, even though the average life of its project portfolio is relatively young.</li> <li>Vena Energy’s integrated capabilities across the renewable energy project lifecycle allow them to optimise development and construction costs, thereby lowering the levelized cost of energy for its off-takers. This is critical in scaling up adoption of renewables and strengthening climate mitigation in the countries where Vena Energy has a presence.</li> </ul>
Climate Change Adaptation	<p><b>Assesses climate related risks and opportunities associated with its own operations and sites.</b></p> <ul style="list-style-type: none"> <li>During the development stage, multiple technical, feasibility and market assessments are carried out to assess the physical climate risks of projects and define relevant mitigants to be put in place.</li> <li>Besides the geotechnical and geophysical studies which covers investigation of soil consistency, groundwater levels, potential hazards and conditions of the project site, physical risks from extreme weather and natural disasters are also considered in the assessment of the project site.</li> <li>Budgets and contingencies are allocated during projects’ investment approval stage, based on Vena Energy’s comprehensive assessments, which are informed by recommendations from third party technical consultants.</li> <li>During operational phase, newly developed climate-related risks will be identified as part of Vena’s active risk management framework and request for budget can be made for risk mitigation actions on a need-to basis.</li> </ul>



## Challenges and key learnings

**1.** Adopting effective governance structure to ensure climate change remains a core focus of the company.

Vena Energy's Sustainability Committee is in-charge of the development, implementation and monitoring of the company's sustainable development policies including those associated with climate change and environmental management. In addition, the remuneration of senior executives in Vena Energy is correlated with climate change performance as evidenced in the KPIs of all senior executives. For climate change to remain a core focus in the company, an effective governance structure to oversee climate mitigation, adaptation and transition as well as linking climate change performance to senior executives' remuneration are critical steps to align management's incentives with long-term shareholders' and stakeholders' interests.

**2.** Prioritizing the development of energy storage systems will be critical for long-term adoption and scaling up of renewable energy systems.

The intermittent nature of renewables calls for the need to develop and deploy energy storage technologies such as battery storage systems and green hydrogen solutions. Vena Energy is already pursuing new technological innovation for energy storage, including battery systems and green hydrogen solutions.

**3.** Working with suppliers to embed circular economy considerations in operations.

Although renewable energy generation is largely sustainable, circular economy concept is still relevant to the production of solar panels, wind turbines and batteries. As part of circular economy considerations, Vena Energy aims to integrate optimal efficiency and longevity in all stages of the project lifecycle. Planning for future asset life extension is a key consideration, however, where this is not a viable option and project decommissioning is inevitable, Vena Energy aims to work in partnership with its suppliers to reuse, recycle and minimise the disposal of the dismantled equipment and material where feasible.

Moving forward, companies involved in renewable energy generation should integrate circular economy considerations not only in how it sources raw materials but also how it manages the disposal of excess material and waste. Achieving this effectively will involve close collaboration with suppliers at different stages of the companies' operations.

**4.** Ensuring conducive policy environment to support technological innovation in the renewable energy sector.

Paris Agreement Objective	Vena Energy: Current Climate Actions
Contribution to the Transition	<p><b>Leveraged green financing to further its sustainability ambitions.</b></p> <ul style="list-style-type: none"> <li>The company signed its first sustainability-linked Revolving Credit Facility (RCF) of JPY52.8bn (USD500m) from eight lenders. The three-year RCF was structured as a sustainability-linked loan and features KPIs such as environmental impact, workplace diversity, and health &amp; safety, contributing to the achievement of the SDG 13 "Climate Action" and in line with Vena Energy's Green Financing Framework.<sup>38</sup></li> <li>Pursuing technological innovation for battery energy storage systems.</li> <li>Vena Energy has been an early mover in the energy storage sector and is currently constructing two battery energy storage systems totalling 141MW in Australia, which are expected to start operation between 2022 and 2023.</li> </ul>
Paris Agreement Objective	Vena Energy: Future Climate Plans
Climate Change Mitigation	<p><b>Working with suppliers to reuse and recycle dismantled equipment and material where feasible, where planning for future asset life extension is not viable and project decommissioning is inevitable.</b></p> <ul style="list-style-type: none"> <li>Vena Energy's recoverable and recyclable materials are taken by third party recyclers. Recoverable materials such as aluminium frames were recycled to the maximum possible extent.</li> </ul>
Contribution to the Transition	<p><b>Pursuing technological innovation for transportable energy storage via green hydrogen solutions.</b></p> <ul style="list-style-type: none"> <li>Vena Energy has established a green hydrogen strategy across the Asia Pacific region. In Australia, it is working together with international and local partners on an early development site which obtained federal funding from the Australian government. This site is expected to produce green hydrogen for both domestic consumption in the first stage (2024/5), and for export to Japan from 2026/7 onwards.</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Commit and set near term and long-term science-based targets including Net-Zero targets.</b></p> <ul style="list-style-type: none"> <li>Setting science-based targets reflect the company's climate ambitions and helps to engage its suppliers in decarbonisation efforts as well.</li> </ul>
Climate Change Adaptation	<p><b>Conduct climate scenario analyses and assess the potential financial impact to the company when the identified climate related risks materialise.</b></p> <ul style="list-style-type: none"> <li>This builds on its existing climate related risks and opportunities assessment for its own operations and own sites and further evaluates the potential financial impacts to the company.</li> </ul>

Considering that Vena Energy's portfolio consists of solar PV, onshore wind, offshore wind, and battery energy storage assets which are green technologies in nature, the risk of Vena Energy's assets being stranded or unviable due to green alternatives is minimal. Having said that, the falling costs of renewable energy means that developers need to take a forward-looking view by investing in technological innovation to remain commercially viable and competitive. In the case of Vena Energy,

the company is pursuing technological innovation for energy storage, including battery systems and green hydrogen solutions. To promote further technological innovation and fast track the adoption of cleaner sources of energy, comprehensive policy support across government bodies will be critical. This is not only to introduce more incentives such as subsidies to encourage the use of hydrogen in different applications, but also attract private-sector capital to invest in the infrastructural solutions for hydrogen adoption.

# Zuellig Pharma

**Headquarters:** Singapore

**Sector:** Healthcare; Services and Healthcare Technology

**About the company:** Zuellig Pharma is one of the largest healthcare services groups in Asia. The company provides distribution, digital and commercial services to support the growing healthcare needs in this region. Established a hundred years ago, Zuellig Pharma has grown to become a USD13bn business covering 13 markets with over 12,000 employees. These employees serve over 200,000 medical facilities and work with over 500 clients, including the top 20 pharmaceutical companies in the world. In addition, the company launched the Zuellig Health Solutions Innovation Centre to pioneer new approaches towards healthcare challenges including data analytics, commercial services, and patient and payor (insurers) services.

**Analysis: Zuellig Pharma potentially falls under the B-List classification upon applying the CCIF and Carbon Trust's scoring methodology.**

Zuellig Pharma has made efforts that align to the "Climate Mitigation" and the "Contribution to Transition" objectives of the AIB-Amundi Climate Change Investment Framework through submitting a 1.5-degree near term science-based target and conducting pilots in sustainable technology solutions. Zuellig Pharma could improve on efforts aligning to the "Climate Adaptation" objective by incorporating temperature-based scenarios in physical risk assessment and the associated financial impacts.

## Context for pharmaceutical sector:

The pharmaceutical industry struggles with several challenges to address climate change, the majority of which relate to procurement and development.<sup>39</sup> Pharmaceutical products undergo significantly stringent R&D stages for new products. The costly retesting and new regulatory approval present barriers to then change the components, packaging, and delivery model of pharmaceutical products.

To address greenhouse gas emissions and improve climate resilience, the pharmaceutical industry needs to prioritise emissions reduction from logistics and distribution as well as responsible waste management linked to packaging materials for their products. These efforts must not only involve the company's direct operations, but also its supply chains.

Paris Agreement Objective	Zuellig Pharma: Current Climate Actions
<b>Climate Change Mitigation</b>	<p><b>Submitted a 1.5-degree near term science-based target aligned with SBTi's target-setting criteria and pending approval from SBTi.</b></p> <ul style="list-style-type: none"> <li>Along with publishing its first GHG report – distinct from its GRI Sustainability Report – since 2020, Zuellig Pharma has aligned its GHG reporting in 2021 to the GHG Protocol framework, expanded its assessment across all relevant direct and indirect emissions categories, sought the external assurance of Bureau Veritas on its GHG emissions disclosures and set near term science-based targets for Scopes 1, 2 and 3.<sup>40</sup> These targets cover both direct and indirect emissions, have been made public, and are currently under assessment by SBTi.</li> <li>Reduced its carbon emissions in 2021 by 7%.</li> </ul> <p><b>Implemented renewable energy and energy efficiency initiatives to reduce their overall energy consumption.</b></p> <ul style="list-style-type: none"> <li>Adopted renewable energy in its operations, increased its renewable energy use by 75% in 2021 through solar installations in 5 of their 11 key markets, with an aim of having 70% of their main distribution centres equipped with solar panels by 2030.</li> <li>Photovoltaic systems are being installed in selected operational sites and distribution centres.</li> <li>Zuellig Pharma has also linked environmental performance indicators to remuneration at the management level.</li> </ul>
<b>Climate Change Mitigation &amp; Contribution to Transition</b>	<p><b>Shifted to greener, more efficient logistics, including cold chain.</b></p> <ul style="list-style-type: none"> <li>Digitalised its operations by deploying a new transport management system (TMS) which enables the company to operate more sustainably in complex logistics networks and reduce emissions.</li> <li>Zuellig's Pharma's Korea team worked together with their logistics providers to pilot their first electric truck for short-distance deliveries in December 2021. A similar pilot has also been launched within Zuellig's own fleets in Thailand in March 2022.</li> <li>Developed the eZCooler, an energy-efficient cold chain packaging solution that ensures the integrity of temperature-sensitive products to the last mile of transportation. Its sophisticated phase-change material and vacuum insulation panels enable it to operate without any reliance upon external energy sources. The eZCooler solution is lighter than traditional cold storage packaging solutions, reducing freight costs and reusable.</li> </ul>
<b>Climate Change Adaptation</b>	<p><b>Performed physical risk assessment analysis in all countries and sites.</b></p> <ul style="list-style-type: none"> <li>Collaborated with FM Global to undertake a company-wide assessment of "high-risk" locations, which are material locations highly exposed to natural hazards such as earthquake, floods, high winds, etc., or situated near the ocean front without adequate mitigation plans in the event of rising sea levels.</li> <li>According to its Sustainability Report 2021, Zuellig Pharma has run 56 climate risk assessments, simulations and trainings across the region and all sites have performed an environmental risk assessment.</li> <li>The company also allocates budget to infrastructural changes to align with climate-related hazards.</li> </ul>

### Challenges and key learnings:

**1.** Reducing emissions in logistics and distribution lines of healthcare companies is critical.

Zuellig Pharma's operations are highly exposed to climate risks due to its presence in 13 markets of which some are particularly vulnerable to climate impacts due to the geographical location. To reduce its energy consumption within its logistics and distribution lines, the company has implemented energy efficient measures such as energy efficient air-conditioning systems or solar panel installations. Moreover, it has leveraged technological innovations like the eZCooler which is able to operate without any reliance upon external energy sources, thereby reducing energy consumption.

**2.** Linking senior executive remuneration for key environmental performance indicators demonstrates strong commitment to action.

Zuellig Pharma has linked environmental performance indicators, for example energy consumption reduction, to remuneration considerations for some of the senior executives. This provides a strong incentive for the executive management to align company operations with climate goals.

**3.** Promoting best practices through industry associations.

Industry associations need to recognise their key role in facilitating knowledge sharing and collaboration in areas such as climate action. At present, Zuellig Pharma is part of the several associations connecting corporates, governments, and non-governmental organisations to improve energy efficiency, fuel efficiency, reduce carbon emissions, and decrease operational costs across the supply chains. This can be an important channel to promote the adoption of proven green technologies to strengthen climate mitigation and adaptation especially in Asian countries which are vulnerable to climate impacts.

Paris Agreement Objective	Zuellig Pharma: Current Climate Actions
Climate Change Mitigation	<p><b>Established a baseline for measuring its waste reduction from responsible waste management initiatives.</b></p> <ul style="list-style-type: none"> <li>In 2021 Zuellig Pharma has reduced its waste emissions by 20% through its 3R programmes.</li> <li>Zuellig Pharma has officially committed to achieve zero waste going to landfill by 2030.</li> <li>Each of Zuellig Pharma's markets has ongoing 3R – Reduce, Reuse and Recycle – programmes to minimise waste to landfill.</li> <li>Evaluates and monitors suppliers' environmental management performance such as their 3R and waste management efforts.</li> </ul> <p><b>Enabling transparency of its value chain to enable deeper Scope 3 target setting.</b></p> <ul style="list-style-type: none"> <li>In 2021 Zuellig Pharma has reduced its Scope 3 emissions by 10%.</li> <li>57% of Zuellig Pharma's spend is managed through the formal sustainability platform IntegrityNext, which considers the sustainability performance of suppliers in its selection process.</li> </ul>
Contribution to Transition	<p><b>Tracks and measures energy savings arising from technological innovations such as the eZCooler solution.</b></p> <ul style="list-style-type: none"> <li>Through the Greenovate Program, an internal Green Initiatives incubator, Zuellig Pharma tracks the energy savings delivered by its technological innovations.</li> <li>In 2021 the Greenovate Project has tracked 12,000 tons of avoided carbon emissions and 4m kWh of energy savings.</li> </ul>
Paris Agreement Objective	Zuellig Pharma: Future Climate Plans
Climate Change Mitigation & Contribution to Transition	<p><b>In Korea, Zuellig is planning to replace all short-distance delivery vehicles with electric vehicles by 2025.</b></p> <ul style="list-style-type: none"> <li>This builds on the Korea team's pilot of their first electric truck for short-distance deliveries in December 2021.</li> </ul>
Paris Agreement Objective	Carbon Trust's Recommendations
Climate Change Mitigation	<p><b>Set a long-term science-based target and net zero target date.</b></p> <ul style="list-style-type: none"> <li>Leaders across the healthcare industries have set a 1.5 degree near term targets, and several have also committed to setting net zero target.</li> </ul>
Climate Change Adaptation	<p><b>Enhance physical risks assessments</b></p> <ul style="list-style-type: none"> <li>Provide clarity around the temperature-based scenarios in physical risk assessments and analyse the potential financial impacts to the company if climate risks materialise.</li> </ul>

# 4. Climate Bonds Initiative: Debt issuers analysis

Climate Bonds Initiative (Climate Bonds) applied the CCIF to evaluate and quantify how well a range of companies are responding to climate change risks across the three objectives of the CCIF, with the aim of providing investors with insights on their exposure to these risks.

## Summary findings

This analysis compiles 483 issuers and covered 33 geographies. The key findings are outlined below.

**1. No companies performed well across all three CCIF objectives.** Even among green bond issuers, this analysis did not identify any issuers that did well on all three objectives of the CCIF: mitigation (target-setting and strategies), adaptation (low risk exposure and/or adaptation plans and strategies), and contribution to the transition (green revenues). However, a group of companies are demonstrating encouraging detail in their disclosures especially around climate mitigation.

**2. Best performers were characterized by green revenues, detailed climate mitigation disclosures, and being in low-risk areas:**

These companies contribute a total of USD466bn of debt outstanding to the market as investment opportunities. However, due to the unpredictable nature of climate impacts, these companies may nonetheless be exposed to climate risks if they do not develop credible climate strategies covering transition, adaptation, and resilience.

**3. Most companies are subject to physical climate risks but are not taking actions to manage them:**

Only 14% of companies researched have an adaptation and resilience plan in place, leaving the rest exposed to potential loss of financial value. This is particularly relevant for EM companies, as many of their domiciles already suffer disproportionately from the physical impacts of climate change. Further planning and implementation action is strongly recommended to manage climate risks.

## Methodology

### Scope and scoring

The research covered a total of 483 companies domiciled across 33 countries (EM Asia: 77%, Latin America: 17%, Europe: 4%, Africa: 2%)

### Climate change mitigation:

Climate Bonds measured this using the following indicators:

1. Paris-aligned targets
2. Robust plans
3. Implementation action

### Climate change adaptation:

Climate Bonds measured this using the ND-GAIN Index score.

This index score covers the vulnerability of countries as well as their readiness to adapt.

This index score has the following levels:

**Level 0:** Extreme risk

**Level 1:** High risk

**Level 2:** Medium risk

**Level 3:** Low risk

All the countries for this research fell within Levels 1 – 3.

### Contribution to the transition:

Climate Bonds measured this using the indicator of % of green revenues.

Green revenues are revenues derived from green business activities.

Green business activities are defined in the Climate Bonds’ ‘[Climate-Aligned Activity Tables](#)’<sup>i</sup> which include requirements for activities across the following climate themes: Energy, Transport, Water, Waste, Land Use & Agriculture.

It should be noted that Green revenue assessments are limited by A) the availability of location-relevant and well-understood definitions of ‘green’ for key sectors, such as energy, industrials, and materials, and B) lack of detail in company disclosures.

### Scoring

All three indicators contributed to the total score of 55, but each indicator was weighted differently.

The climate mitigation indicator carried the most weight due to its relative importance: it measures issuers’ understanding of the magnitude of their transition risks, and their ability to mitigate them via appropriate plans, governance, and financing. The mitigation score and its constituent indicators are explored further in the dedicated section below.

Based on the total score, issuers were categorised into three groups: Laggards (0-10), Mid-tier (11-24) and Leaders (>24)<sup>ii</sup>

In Climate Bonds’ view, “Leaders” can be considered to be “A-List” companies and “Mid-Tier” companies, “B-List”.

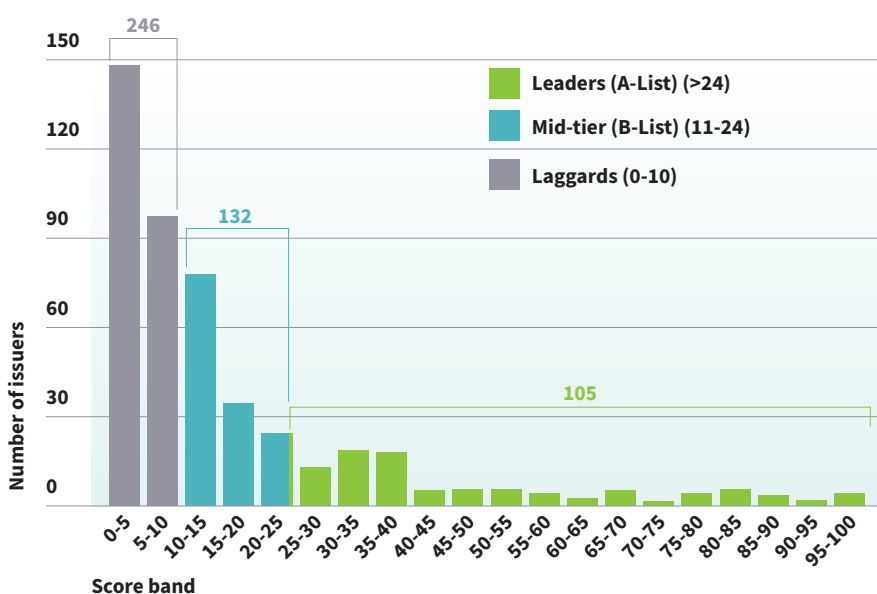
## Results

The following sections represent the results of assessing debt issuers’ performance across the climate mitigation, adaptation, and contribution to transition objectives.

### Issuer score groups and distribution

The issuer scores were distributed into 105 issuers (22%) in the leaders’ group, just over a quarter (132 issuers or 27%) classified as mid-tier, and more than half (51%) or 246 companies as laggards. The full sample score distribution is shown in the chart below.

Chart 9. Distribution of issuers’ normalised scores



i. <https://www.climatebonds.net/market/climate-aligned/methodology>  
 ii. The normalised scores for the categories: 24+ (leaders), 10 – 24 (mid-tier), and 0 – 10 (laggards)

Table 6. Summary of issuer performance against CCIF objectives

Issuer grouping	Mitigation		Adaptation			Contribution to transition	Average debt outstanding
	Average normalised mitigation score (max. 88/100)	Share of issuers with labelled debt outstanding	Physical risk level split		Share of issuers with adaptation and resilience plan in place	Average green revenue percentage	
Leaders	39.84	28%	Low	9%	55%	80%	USD1.77bn
			Medium	33%			
			High	58%			
Mid-tier	8.95	16%	Low	34%	9%	82%	USD640m
			Medium	48%			
			High	18%			
Laggards	2.20	13%	Low	0%	0%	76%	USD2.1bn
			Medium	74%			
			High	26%			

Analysis of the groups against the CCIF objectives showed some differences, which are summarised in table 6 and following sections.

### Leaders

The smallest, highest-scoring group of companies in the sample – the leaders – comprises issuers that are highly engaged with integrating climate risk.

On average, even though they are in medium or high-risk geographies, more than half have a climate adaptation and resilience plan in place. In addition, these issuers score high on climate mitigation scores compared to other groups.

These issuers are also characterised by relatively high average debt volume. They are also more likely than their mid-tier and laggard peers to have issued at least one labelled green or sustainability-linked bond.

However, on average, they have slightly lower green revenues than their mid-tier peers, and labelled bond issuance may be used as a mechanism to increase that share over time.

Though no issuer from the leaders group scored perfectly on all the indicators – i.e., did not yet meet all the objectives of the CCIF – these companies are, on average, performing well across all the indicator groups and represent interesting investment opportunities when considering climate outcomes and risk management.

### Mid-tier

The second-largest group, the mid-tier companies show some signs of market engagement and progress towards higher climate contribution as shown for example in the highest average green revenue percentage of the groups at 82%. They are characterised by relatively low risk exposure from transition (already highly engaged in green activities) and physical climate impacts (more than a third are in low-risk geographies, and close to half in medium risk areas). This may help to explain why they provide less disclosure on their climate plans and impacts with only 9% disclosing an adaptation plan, and the group overall scoring lower on mitigation than the leaders. Mid-tier issuers also tap into debt capital markets less than their peers: they have raised on average USD640m with bonds, and 16% of the group have issued labelled debt. This may also be related to the lower levels of disclosure: fewer instances of (large) issuances require less resources to produce disclosure for. Based on risk exposure and contribution to the transition via green revenues, the mid-tier group comprises companies that could be relevant for transition investors, but the lack of disclosure should be closely monitored to understand how those companies more exposed to climate risk – transition and physical – are managing it.

### Laggards

The laggards' group is the largest one in this research sample. Despite these companies' average green revenues being high, these companies seem otherwise relatively disengaged from climate issues based on their public disclosure. They are exposed to medium and high physical risk from climate change, but none provided disclosure related to an adaptation plan. Similarly, their mitigation score is the lowest of the groups. They issue on average the most debt out of the groupings but have the lowest share of labelled bonds out of the groups. Investors looking into these types of companies could engage with them to push for additional climate planning covering the full suite of risks, and associated disclosure to be made available. This will help with a more holistic assessment of the climate profile of companies in the current laggards group.

### Top 10 leaders

The top leaders from the sample of companies operate across different sectors and come from several geographies. Notably, not all have high green revenues, suggesting that they are still implementing a transition towards low-carbon business models.

Table 7. Top 10 leaders from the research sample

Company	Normalised Score	Location	Green revenues	Sector
Cia de Eletricidade do Estado da Bahia SA	100.00	Brazil	High contributor (97%)	Energy
Neoenergia SA	100.00	Brazil	High contributor (97%)	Energy
Centrais Eletricas Brasileiras SA	87.80	Brazil	High contributor (97%)	Energy
Cia Energetica do Ceara	85.37	Brazil	High contributor (98%)	Energy
Ampla Energia e Servicos SA	85.37	Brazil	High contributor (98%)	Energy
Enel Americas SA	80.49	Chile	Low contributor	Energy
Enel Chile SA	80.49	Chile	Low contributor	Energy
ASE Technology Holding Co., Ltd.	95.12	Taiwan, China	Low contributor	Industry
China Everbright Environment Group Ltd.	92.68	China	High contributor (97%)	Waste
Hyundai Motor Co.	90.24	South Korea	Low contributor	Transport

### Geographies: Regional performance

When assessing regional performance in more detail, Latin America scores the best with a normalised average score of 33 out of 100. Europe and Africa follow, with normalised averages of 25 points each. Asia totals the lowest (16/100).

#### Regional Distribution

On average, there is limited disclosure around climate change mitigation, adaptation, and contribution to the transition in Asia compared to other EM regions included in the universe. Asia is nonetheless home to the largest share of companies included in our universe, and thus constitutes the most representative sample. Africa represents the least representative sample of the universe as it only accounts for three entities.

Table 8. Regional overview

Region	Number of issuers	Share of sample	Average regional normalised score
Latin America	82	17%	33
Africa	3	0.06%	25
Europe	24	5%	25
Asia	374	77%	16

## Performance on climate change mitigation

This section explores the companies that perform best in their efforts to mitigate climate change across the entire research sample.

### Target-setting

Just over half of the countries where companies in the sample are domiciled have made a commitment to reach net zero by 2050, while only 19% of companies have done the same. This highlights that the climate ambitions of the companies included in our universe fall short of their governments' commitments. In addition, just over half of the companies with net zero commitments have set science-based targets, which accounts for only 10% of the sample.

Half of the top 10 mitigation performers have minimum 75% green revenues (are financial contributors to the transition). The top four companies Neoenergia SA, Cia de Eletricidade do Estado da Bahia SA, Centrais Eletricas Brasileiras SA and China Everbright Environment Group Ltd. are high contributors, while AB Ignitis Grupe is the only moderate contributor. The remaining half of the top 10 do not currently exceed the 75% revenue threshold from green activities but have developed credible transition strategies.

Both ASE Technology Holding Co., Ltd. and Taiwan Semiconductor Manufacturing Co., Ltd. (both based in Taiwan, China) have set science-based emission reduction targets and have also come to market with labelled green bonds, thereby signalling to investors their intention to transition. Enel Generacion Chile SA has also set science-based target, while Hyundai Motor Co., which has issued labelled green bonds, has not.

### Emissions reporting

All top 10 mitigation performers report on their scope 1, 2 & 3 GHG emissions. Overall, reporting on emissions across scope 1-3 is more widespread compared to setting targets, with 22% of the companies currently providing data on their emissions in their annual accounts or integrated or sustainability reports.

Table 9. Issuers' climate change mitigation performance summary

Mitigation		
Indicator met	Number of issuers	Percentage of research universe
Net zero target (2050 or sooner)	91	19%
Science-based target	52	11%
Scope 1 – 3 emissions disclosure	109	23%
Climate change governance mechanism	115	24%
Green bond issuance	70	15%
SLB issuance	3	0.06%

Table 10. Top 10 companies – climate change mitigation

Company	Normalised score	Location	Green revenues	Sector
Neoenergia SA	87.80	Brazil	High contributor (97%)	Energy
Cia de Eletricidade do Estado da Bahia SA	87.80	Brazil	High contributor (98%)	Energy
Centrais Eletricas Brasileiras SA	80.49	Brazil	High contributor (98%)	Energy
China Everbright Environment Group Ltd.	87.80	China	High contributor (97%)	Waste
AB Ignitis Grupe	75.61	Lithuania	Moderate contributor (79.5%)	Energy
CEZ AS	78.05	Czech Republic	Low contributor	Energy
Enel Generacion Chile SA	73.17	Chile	Low contributor	Energy
ASE Technology Holding Co. Ltd.	87.80	Taiwan, China	Low contributor	Industry
Taiwan Semiconductor Manufacturing Co. Ltd.	75.61	Taiwan, China	Low contributor	Industry
Hyundai Motor Co.	82.93	South Korea	Low contributor	Transport

While this is encouraging, companies should contextualise this against a net zero future by defining credible transition strategies. To date, 26% of the sample companies disclosed a transition strategy or plan, while 24% have established related transition governance mechanisms such as appointing dedicated board member and/or team responsible for implementing their climate strategy.

### Green bond and SLB issuance

Issuing labelled debt contributes towards financing the transition to a low-carbon economy and sends a positive signal to investors and stakeholders. Labelled bonds offer opportunities to earmark funds to act on climate change and support transition plans. Only 15% of the sample companies have so far issued labelled bonds; this tracks the limited disclosure on transition plans and implementation action. Green bonds are the most common thematic instruments: 70 companies have issued at least one green bond. Three entities issued sustainability-linked instruments. Issuing labelled bonds is highly encouraged also for those companies whose transition strategies are not yet fully developed, as the issuance process involves companies green tagging their activities and assets and to initiate the process of transition and physical risk assessment. Labelled bonds can also raise company profile, thereby providing access to a broader and stickier investor base. Labelled instruments benefit from a greater degree of transparency which can attract more funding, especially in emerging markets.

### Issuer spotlight: Climate change mitigation

#### TSMC (ICT / technology & electronics)

Taiwan Semiconductor Manufacturing Company (TSMC) is the world's largest semiconductor foundry. The semiconductor industry is vital for the world economy and is also known for its cutting-edge technologies and some of the world's most complex supply chains, thus, TSMC's climate change mitigation and adaptation strategies are crucial for its business success and the world economy.

TSMC has an internal sustainability committee responsible for decarbonisation strategies and performance monitoring. The company is committed to short-term target of zero emissions growth by 2025 and net-zero by 2050. TSMC also reports its scope 1, 2 and 3 CO<sub>2</sub> emissions. Within its CSR report, TSMC provides clear CO<sub>2</sub> projections, with established science-based targets for short, medium and long-terms, which are externally verified by DNV GL. TSMC has been a member of the Science Based Target Initiative (SBTi) since 2017. With both sound internal and external reporting in place, TSMC is on track to reduce GHG in the coming years and comply with a well-below 2°C target set by Paris Agreement.

TSMC seeks to lower their scope 1 emissions by optimising gas quantity used in production and deploys abatement equipment to treat fluorinated GHG. To reduce scope 2 emissions, the company has taken measures such as the construction of LEED-certified green buildings, purchase of renewable energy to power production, as well as making their office spaces 100% reliant on renewable energy

supported by employment of next-generation highly energy efficient production tools. To address scope 3 emissions, the company strives to reduce carbon footprint from raw materials and optimise delivery schedules. TSMC has partnered with third party advisors to develop carbon negative technologies and to obtain carbon credits. TSMC has also kickstarted carbon trading systems in China. This demonstrating the company's awareness of carbon cost and ensuring that the company is on track to achieve its targets – their implementation actions demonstrate the robustness of their strategies as well as credibility and commitment.

TSMC also has a strong climate adaptation strategy. The company follows the TCFD framework for climate risk evaluation and identifies floods, droughts and rising temperature as the main physical risks. The direct financial costs from climate change include asset damages and production disruption. Annual emergency response drill to test different climate scenarios have been conducted to manage the identified climate-related risks. The company states that not a single day of their production was interrupted by climate disasters. TSMC has also constructed reclaimed water plant for one of their science parks and established comprehensive water monitoring system as the production of semiconductor chips is very water intensive. Other measures include elevating building foundation and engaging in energy conservation.

### Climate change adaptation performance

EM suffer disproportionately from the impacts of climate change. Identifying physical risks is pivotal to assess whether business activities in high-risk geographies will be slowed down or interrupted by climate change related acute weather conditions. Companies based in high-risk areas need to develop credible transition strategies and enact adaptation and resilience plans to continue their businesses in the run to 2050. Similarly, investors need to quantify physical related risks to assess their risk exposure.

Most of the companies in the sample (58%) are based in medium risk areas. Just over a third (36%) are domiciled in high-risk geographies, and a smaller share of 11% reside in low-risk geographies. Adaptation and resilience plans can help mitigate some of the impacts of climate change, especially for companies based in high or medium risk areas. Less than a fifth (19%) of all the sample companies disclosed some type

Table 11. Issuers' adaptation performance summary

Climate change adaptation and resilience			
Physical risk level	Number of issuers	Percentage of research universe	Of which have A&R plan in place
High risk	150	31%	39 issuers / 26%
Medium risk	279	58%	26 issuers / 9%
Low risk	54	11%	3 issuers / 6%



of adaptation and resilience plan, indicating that most companies do not yet consider adaptation and resilience as part of their climate transition strategies. Out of the companies based in high-risk geographies, roughly a quarter (26%) consider adaptation and resilience, while only 11% do so in medium risk geographies. The equivalent figure in the lowest-risk areas is 6%. In a warming world with significant uncertainty on achieving a 1.5C or less than 2-degree future, credible transition plans should incorporate investments into adaptation and building resilience against intensifying climate impacts. Half of the overall leaders in the sample (the highest-scoring companies) include adaptation and resilience plans in their public disclosure.

### Issuer spotlight: Climate change adaptation

#### Sarawak Energy Berhad (Electric utility)

Sarawak Energy Berhad's (Sarawak Energy) is a vertically integrated electric utility and energy development company in the Malaysian state of Sarawak. The company serves an area with almost three million people, playing a key role in advancing Sarawak's economic and industrial growth and delivering on their ambition to reach developed status by 2030.

In 2019, for the first time in its corporate reporting history, the company combined its annual and sustainability report to present financial and non-financial performance in an integrated document. Integrated reporting is an effective way to communicate a company's commitment to meet financial and socio-environmental objectives. This generates long-term value for its shareholders and ensures that material risks are not being overlooked.

Sarawak Energy' is a moderate contributor to transition with 75% of its electricity generation coming from renewables; the remaining 25% is based on thermal energy to ensure constant supply on peak energy demand. In the absence of segmented revenue disclosure, this method is an effective way of evaluating an issuer's exposure to green business activities . The company has been on a decarbonisation journey since 2011 and its renewable energy share has escalated sixteen-fold (1623%) from the base year. This resulted in a 68% reduction of Sarawak's CO<sub>2</sub> emission intensity (which now stands lower than the global average) and it represents a significant contribution to global climate change mitigation efforts.

The company is also committed to further embedding climate action into its business strategy by implementing TCFD recommendations. As part of its integrated approach to climate action, the company highlights the importance of assessing the business's future exposure to both transition and physical climate-related risks and developing strategic plans for future scenarios. To this end, the company has conducted climate scenario analysis for the Malaysian state of Sarawak based on historical and forward-looking climate data, as well as vulnerabilities and impacts by the World Bank. This allowed for the identification of risks and opportunities related to Sarawak Energy's assets and services across the supply chain for different time periods (short, medium-short, medium-long and long-term). Risks and opportunities and their impacts on the company's business strategies and financial planning, have been listed in the integrated report for different time horizons, in accordance with TCFD and SBTi standards. For instance, the company cites increasing cost of carbon and better carbon emission reporting as key risks and opportunities associated with their corporate activities. In addition to the impacts such initiatives will have on Sarawak Energy, the list includes a shift away from non-renewable generation sources, the development of flexible system infrastructure to integrate renewable energy and developing best practices to manage climate-related risks.

### Contribution performance to the transition: Green revenues

Over 50% of the sample of issuers have greater than 75% green revenues, i.e., are financially contributing to the low-carbon transition: 178 companies (37%) are considered high contributors (95%+ green revenues), and 75 (15%) moderate contributors (75%+ green revenues). The latter are less common in the sample because they tend to have diversified business activities, some of which are not yet green. Further, the disclosure on the greenness of activities tends to be limited, which makes the revenue assessment challenging. Conversely, pureplays are more common in our universe because they tend to operate in a single (potentially green) industry sector, which facilitates the screening of their activities.

Most of the companies in the sample with green revenues are energy companies, with a total of 105 high contributors and 41 moderate ones.

Table 12. Issuers' contribution performance summary

Financial contribution to transition		
Indicator	Number of issuers	Percentage of sample
95%+ green revenues (high contributors)	178	37%
75%+ green revenues (moderate contributors)	75	15%
<75% green revenues (low contributors)	230	48%

Water is the second most common revenue theme with 45 companies followed by transport (28 companies), waste (25 companies) and land use and agriculture (14 companies).

High and moderate contributors perform variably on the overall scoring, indicating they are in different phases of integrating transition strategies. Conversely, some low contributors have high-quality climate strategies, indicating that green revenues should not be used as the sole indicator to assess climate-related risks for businesses or investors, or to identify investment opportunities. They should be complemented by credible transition strategies and adaptation and resilience plans. Activities and assets categorised as green can still be linked to high scope 2 and 3 emissions, which could result in contributor companies being misaligned with net-zero objectives.

EM contributor companies need to understand their transition and physical risks in the run to 2050. The latter is particularly relevant as EM suffer disproportionately from the physical impacts of climate change which can compromise their financial value in the long term. Credible transition strategies are those which include risk management associated with changes in regional and global climate policies, while adaptation and resilience strategies are pivotal to manage physical risks posed on assets and activities.

Contributor companies are also exposed to physical risks; 35% of high contributors and 43% of moderate contributors are in high-risk areas. Only 18% of the former and 6% of the latter in high or medium-risk areas have developed sufficient climate transition strategies, accounting for 29% of the sample and USD178.7bn of debt. All companies are urged to develop credible transition strategies to increase their financial value and continue to be relevant in a low-carbon future.

Labelled bonds represent great opportunities for issuers to signal to investors their intention to transition. In our sample, moderate contributors came to the market with the highest share of labelled bonds – 16% of their outstanding debt. High contributors labelled 12% of their debt, while labelled issuance accounts for 8% of low contributors' debt. Green labelled bonds are the most common: they account for 95% of the labelled debt in the universe. There is more scope for high contributors to issue in the green bond market because their business activities are mostly already eligible under existing green definitions and can thus be refinanced under the green label.

### Issuer spotlight: Financial contribution to transition

#### China Everbright Environment Group Ltd. (Energy, Waste, and Water)

China Everbright Environment Group Ltd. (Everbright Environment) is a China-based environmental solutions provider with sub business units including Environmental Energy, Greentech, Environmental Water, which cover a broad range of pipelines including waste-to-energy conversion, renewable energy generation, waste treatment, water treatment and technology R&D. Everbright Environment is the largest waste-to-energy investor and operator worldwide. China Everbright has invested in green assets that include multiple waste-to-energy plants, solar and wind farms, water treatment centres but also provides services such as environmental planning and the restoration of ecosystems across China, showing a diversified portfolio and contributing to the world's effort to transition to a more climate resilient economy and meet Paris-aligned goals.

In their CSR report, the company discloses its current GHG emissions with a clear scope 1, 2 and 3 breakdowns. To ramp up their climate mitigation efforts and become aligned with the 2°C goal in the long-term, the company keeps its decarbonisation strategy consistent with International Energy Agency's framework which is aligned with Pairs Agreement. The company is currently reviewing its long-term decarbonisation strategy: its emission reduction target is currently under review and will be announced in due course.

As an environmental solution provider and a high contributor through its green revenue streams, Everbright Environment has good practices regarding the contribution to

transition as their business activities promote transition to climate resilience. The company has set up the Environmental Management Committee, which is dedicated to minimising the firm's environmental impact and strengthen internal reporting. The company's CSR report is verified by the Hong Kong, China Quality Assurance Agency as a part of their external reporting effort. Everbright Environment's 2020 annual report also confirms that 100% of its HKD 42.9bn of revenues are generated from activities that contribute to climate change solutions. For instance, their waste-to-energy business processed tens of millions of tonnes of waste and converted to green electricity, offsetting more than 15 million tonnes of CO<sub>2</sub> emissions. China Everbright's water stress management business aims to recycle water; this process can achieve a recovery rate of 80% through ultrafiltration, nanofiltration and reverse osmosis.

Everbright Environment is an active player in the contribution to the transition. The company engages in extensive technology R&D, seeking to cut GHG emissions from their activities. For example, they use self-generated renewable energy to power the operations of their wind and solar farms, at the same time reducing the purchase of non-renewable energy for other business segments; this allows for reduction of scope 2 emissions. The company is also improving the operational efficiencies of its green electricity supply and waste treatment centres as part of the increasing demand for sustainable waste treatment.

Current low contributors could benefit the most from labelling their debt. As highlighted in the "Green Bond Treasurer Survey" conducted by Climate Bonds, the labelling exercise helps issuers to understand the environmental impacts of their activities by initiating the green tagging process to identify low-carbon assets and projects, and conversely identifying which activities still need to transition and how. In addition, the green label offers benefits such as strengthened internal coordination between

departments, and enhanced reputation and market visibility. These can result in a broader and stickier investor base, which is particularly critical for EM entities that attract limited investment from developed markets due to credit risk and ESG concerns. Green bonds from issuers with credible, transparent transition plans can help to increase the flow of green investments into EM.

# Appendix

## Climate Bonds Initiative methodology

### Climate Mitigation Indicators (adapted from Climate Bonds Hallmarks of a credibly transitioning company)



#### Hallmark 1: Paris-aligned targets

Currently, limited universally agreed industry/sectoral decarbonisation pathways are available to benchmark company specific KPIs and associated performance levels. The target-setting assessment is therefore based on company specific decarbonisation targets. Each are assessed as a binary (yes/no) with an associated score.

- Country level of the company domicile commitment to net-zero
- Company commitment to net-zero by 2050
- Decarbonisation strategy based on key milestones
  - Short term (up to 2025)
  - Medium term (2025-2030)
  - Long term (2030-2050)
- Science-based company specific KPIs
- Science-based company specific KPIs verified
- KPIs addressing all sources of CO<sub>2</sub> emissions:
  - Scope 1
  - Scope 2
  - Scope 3



#### Hallmark 2: Robust plans

Hallmark 2 aims to determine the credibility of the targets/KPIs setting process described in Hallmark 1. This type of assessment will rest upon a qualitative and binary (yes/no) assessment of a company's strategy towards decarbonisation:

- Company has transition roadmap/strategy towards decarbonisation publicly available
- Company has a dedicated financing plan (e.g. CapEx, OpEx, M&A, R&D activities necessary for transition strategy)
- Company has adequate governance mechanism in place (Sustainability Department/Head of Sustainability/Board oversight of climate change)



#### Hallmark 3: Implementation action

Hallmark 3 reflects the action undertaken to deliver on Hallmark 2

- Company reports on investments into new green activities in their annual accounts
- Company has issued labelled green bond
- Company has issued multiple labelled green bonds
- Company has issued sustainability-linked bond(s)

Note: Not included in this research

**Hallmark 4: Internal monitoring** involves i) on-going re-evaluation and recalibration of targets to reflect changing operating conditions and market developments and ii) tracking performance against selected KPIs to monitor performance against the selected KPIs, and the delivery of the underlying actions.



#### Hallmark 5: External reporting

Hallmark 5 requires on i) third party entities to provide an independent verification of the KPIs and strategy to deliver transition goals as well as ii) annual reporting of independently verified progress in terms of action taken and performance against targets.

- Public disclosure of key indicators across Hallmarks 1 – 3
- Disclosure of current CO<sub>2</sub> emissions:
  - Scope 1
  - Scope 2
  - Scope 3
- Note: independent verification of emissions data was not a requirement for this Hallmark as part of this research project.

Scoring framework- debt issuer analysis			
	Indicator	Number of points: Y	Notes
Contribution	Country commitment to net-zero (Y/N)	1	
	Low contributor	0	
	Moderate contributor	1	
	High contributor	2	
Mitigation	Company commitment to net-zero (Y/N)	2	-1 if country commitment is 1
	Short-term commitment by 2025 (Y/N)	2	
	Scope 1	1	Contingent on overall company target
	Scope 2	2	
	Scope 3	3	
	Medium-term commitment - 2025-2030 (Y/N)	3	
	Scope 1	1	
	Scope 2	2	
	Scope 3	3	
	Long-term commitment -2030-2050 (Y/N)	1	
	Scope 1	1	
	Scope 2	2	
	Scope 3	3	
	Science-based targets (Y/N)	3	
	Target verifier	2	-1 if no Scope 3 reporting
	Scope 1 emissions	1	
	Scope 2 emissions	1	
	Scope 3 emissions	2	
	Company transition roadmap/strategy available (Y/N)	1	
	Company dedicated transition financing plan in place (Y/N)	2	
	Sustainability transition governance mechanism (dedicated Board member / team) in place (Y/N)	1	
	Report on investments into green assets (Y/N)	1	
	GB issuer (Y/N)	1	
Multiple GB issuer (Y/N)	2		
SLB issuer (Y/N)	0.5		
Adaptation & Resilience	Climate adaptation / resilience plan in place (Y/N)	2	
	Notre Dame Index Score		
	Level 0 (extreme risk)	0	
	Level 1 (high risk)	1	
	Level 2 (medium risk)	2	
	Level 3 (low risk)	3	
	<b>Max. total points (all scores normalized to 100)</b>		<b>55.5</b>

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