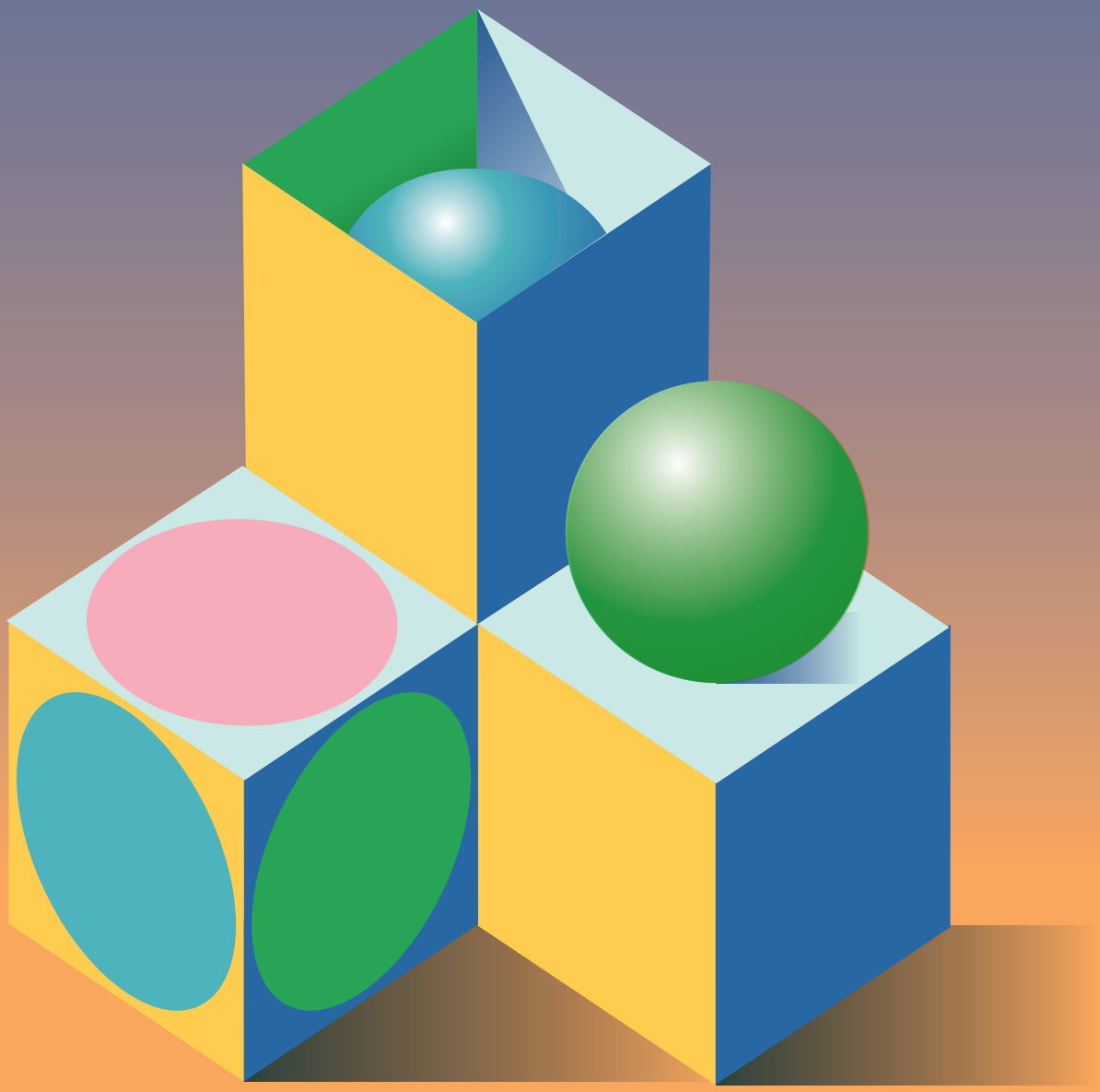
COMPANIES AND CLIMATE CHANGE

An updated research application of the AIIB-Amundi Climate Change Investment Framework



ASIAN INFRASTRUCTURE INVESTMENT BANK

Amundi ASSET MANAGEMENT

Climate Bonds INITIATIVE

FitchSolutions

Report summary

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The Climate Change Investment Framework (CCIF) was designed by the Asian Infrastructure Investment Bank (AIIB) and Amundi to tailor investment portfolios that actively consider alignment with the Paris Agreement.

The CCIF considers the three dimensions of climate change mitigation and adaptation, and contribution to the transition to net zero. BMI, a Fitch Solutions Company, and the Climate Bonds Initiative (Climate Bonds) have applied the CCIF at a country and sector level (BMI), and an entity level (Climate Bonds). This is a follow up report, which highlights the energy transition performance of the automotive (auto), technology-electronics (tech-electronics), healthcare, and basic industries sectors. The results of the research are presented in this report.

Key findings

There is evidence that the objectives of the Paris Agreement are being integrated into the strategy of companies across all sectors.

The degree of strategic integration varies at country level and within each sector, pointing to the need for consistent policy support.

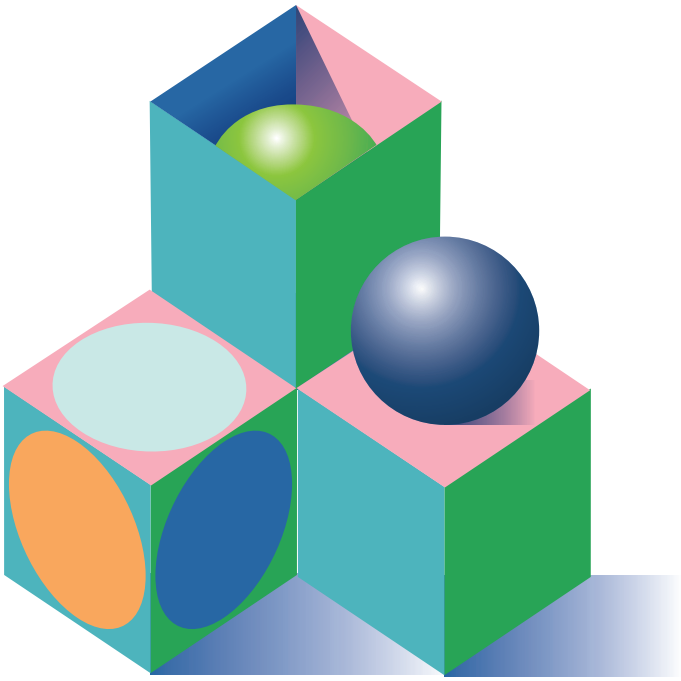
Among the three objectives of the Paris agreement of climate change mitigation, adaption, and contribution to the transition to net zero, adaptation is the one receiving the least attention from entities in the form of physical risk assessment, and consequently the management of those risks. This was barely mentioned by any of the entities examined in the company level research.

Common international environmental disclosure standards such as the Global Reporting Initiative (GRI) are being increasingly used, facilitating the categorisation of companies by degree of advancement of their mitigation efforts.

This report provides an update of the Companies and Climate Change Report published in January 2023.[1]

BMI helps its clients better understand the opportunities and risks they face, particularly in emerging and frontier markets. BMI's team of country risk and industry research analysts provide authoritative, in-depth coverage of over 200 markets and more than 20 industries. They integrate political, macroeconomic, and industry expertise into all their analyses so that the client benefits from understanding how each aspect impacts the other in their chosen markets.

Climate Bonds Initiative is an international organisation working to mobilise global capital for climate action. Climate Bonds Standard and Certification Scheme is a labelling scheme for bonds, assets, and whole entities. The scheme is used globally by bond issuers, governments, investors, and the financial markets to prioritise investments which genuinely contribute to addressing climate change.



Introduction

The Paris Agreement calls for 'making finance flows consistent with a pathway towards low greenhouse gas (GHG) emissions and climate-resilient development.'[2] To achieve the Paris Agreement goals, all sectors of the global economy, and in particular hard-to-abate industries, must rapidly decarbonise. The Asian Infrastructure Investment Bank (AIIB)-Amundi Climate Change Investment framework (CCIF) was designed to help tailor investment portfolios that actively consider alignment with the Paris Agreement. The CCIF translates this into three objectives based on fundamental metrics that investors can use to assess alignment with the Paris Agreement:

1. Climate change mitigation: holding the increase in the global average temperature to well below 2°C above preindustrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

2. Climate change adaptation: adapt to adverse impacts of climate change and foster climate resilience.

3. Contribution to the transition: making finance flows consistent with a pathway towards low greenhouse gas emissions and climate resilient development.

This initial assessment enables the identification of investment opportunities, a pool of companies to engage with, that are not necessarily climate leaders in their sectors but have initiated the integration of climate transition into their strategy. Supporting these entities encourages the integration of climate change risks and opportunities into business practices and could give investors an opportunity to benefit from any future repricing of these risks.

The framework makes use of the growing universe of environmental, social and governance (ESG) and climate transition metrics. Mandatory or voluntary corporate ESG disclosures have been in effect for several years in various countries (e.g., Thailand in 2017, Viet Nam in 2013, India in 2022) and indicate the current environmental and social impact of a company. In parallel, the Task Force on Climate-Related Financial Disclosures (TCFD) recommendations have been widely accepted by companies worldwide who want to provide information on their climate-related financial risks and opportunities, including those associated with physical impacts. The need to go a step further has emerged more recently and the latest mandatory and voluntary disclosure frameworks include net-zero transition plans. These forward looking plans describe how companies will align with the Paris Agreement by selecting an appropriate decarbonisation pathway and adapting their business model to transition to a net-zero economy, thereby mitigating transition and physical risks. A credible transition plan should be an all-encompassing strategy that captures the three dimensions pinpointed by the CCIF.

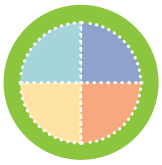
Following its launch in 2020, the CCIF was tested by several climate finance research organisations.[3] Initial research outcomes confirmed that the integration of climate change differed strongly among companies in the same sector, highlighting the leaders and laggards in climate strategy integration. The research also identified that sectors closer to a net zero-economy business model were aligning faster to the goals of the Paris Agreement. No companies performed well along the three CCIF dimensions, with resilience to physical risk being the dimension the least integrated in corporate strategy. Transition plans were rarely disclosed, and data to assess the mitigation dimension were inconsistent. Finally, the research highlighted that a company's financial capability to transition was among the most challenging factors in performing well across the three dimensions.

This report discusses the process and results of the application of the CCIF at three levels.

Country level

BMI examined the progress of 18 markets in the Asia-Pacific (APAC) region in terms of their energy transition momentum and the investment attractiveness of each through its low carbon energy transition framework.

Sector level



In this update report, BMI assessed the performance of four sectors around the three pillars of the CCIF and examined the progress of these sectors. The chosen sectors were auto, tech-electronics, healthcare, and basic industries.

Entity level

Climate Bonds used the principles and Standards underpinning its Paris-aligned Certification of entities to test the level of corporate transparency and ambition against the three CCIF objectives. Climate Bonds also conducted in-depth analysis of the transition plans of four companies to illustrate the level of additional information that transition plans provide, and finally examined the extent to which issuers of labelled debt were aligned with the Paris Agreement, using examples of labeled debt instruments.

Country level analysis

Introduction

BMI's Low-Carbon Energy Transition Framework is a benchmarking tool measuring the progress of 18 markets in the APAC region towards a clean energy future. This assessment is rooted in the three main pillars of the CCIF: climate mitigation, adaptation, and contribution to the transition.

- **Climate mitigation** encompasses strategies to reduce emissions, such as phasing out fossil fuels; promoting the adoption of electric vehicles; and increasing low-carbon hydrogen production.
- **Climate adaptation** includes increasing renewable power capacity, reducing reliance on electricity imports, and growing energy storage capacity.
- **Contribution to the transition** is an assessment of the effectiveness of market policies and regulations in promoting emission-reduction technologies.

The framework uses a range of indicators to offer a detailed analysis of each market's progress. These include characteristics such as the renewable share of a country's power mix, public expenditure, GDP growth rate and energy policies. It also considers industry rewards like low-carbon capacity and growth, and potential risks such as a market's competitive landscape, logistics risks, and labour market challenges (see Appendix1).

Key Index Findings

- Australia and China perform very well in the framework due to their supportive business environments for low-carbon energy transition and robust renewable sectors.
- High-emission power types still remain dominant in the regional power mix, accounting for almost 60% of power generation between now and 2032. This presents significant opportunity for low-carbon power as energy transition accelerates in APAC.
- Newer technologies such as EVs and hydrogen are still limited in the region. Electrification efforts are supporting these new technologies, which should drive a growth in electricity consumption.
- The energy trilemma of cost, sustainability, and security presents a challenge for APAC markets in terms of energy policy. There needs to be a balanced approach to energy policy across the region.
- Developed markets across the region tend to have stronger country fundamentals, benefit from higher government spending, and as a result suffer from lower grid losses, meaning renewable development in these markets is less risky.
- Developing markets tend to be risky but some, such as Thailand, Indonesia and India score well on the Rewards part of the framework. Moreover, India, Indonesia, Viet Nam and the Philippines account for 90% of global coal growth, offering financial institutions ample opportunities to support a transition.

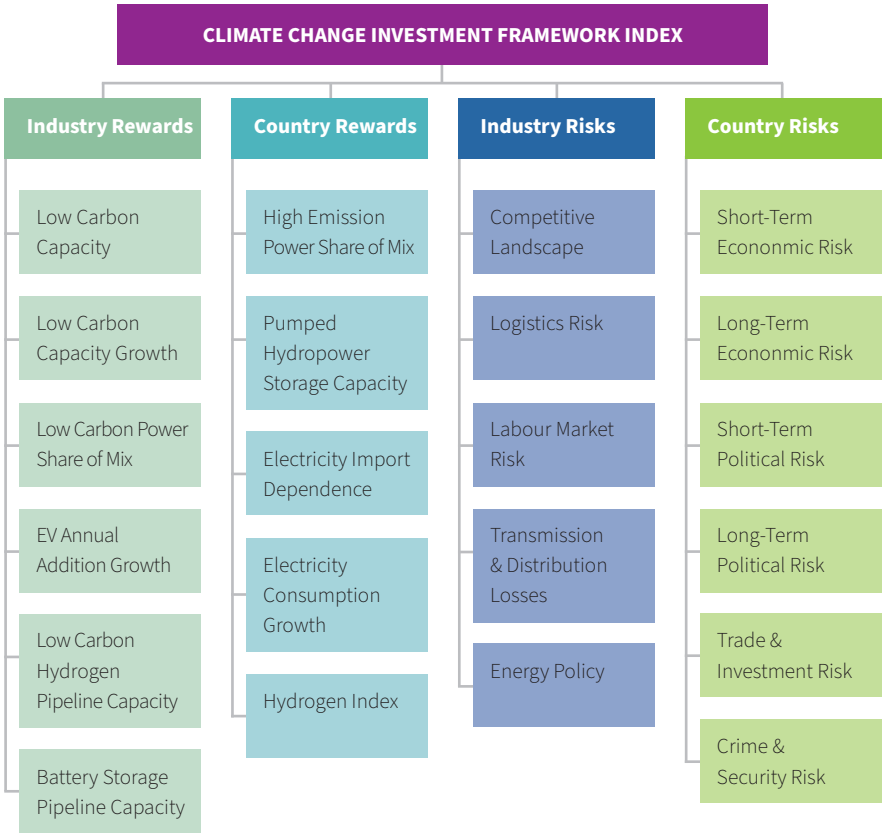
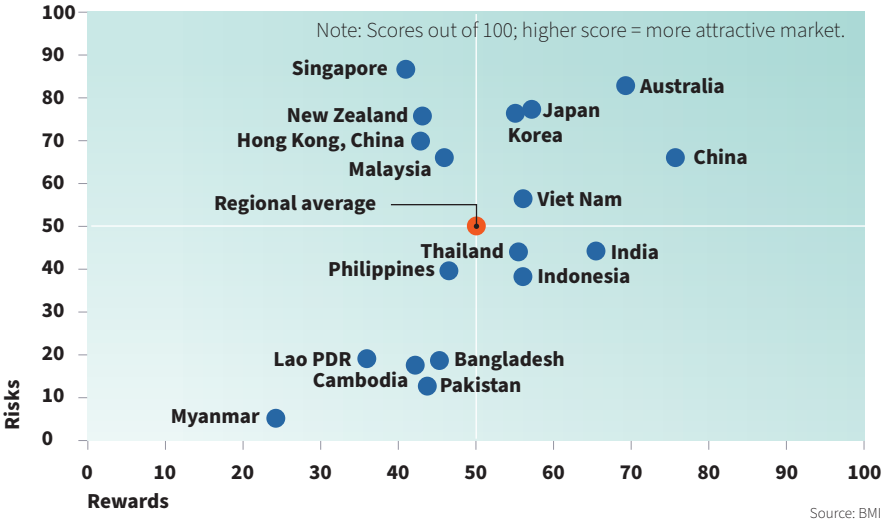


Figure 1.1: Australia and China lead the market in low-carbon energy transition

Asia-Pacific Low-carbon energy transition index, by risks and rewards



Source: BMI

Low-Carbon Energy Transition Framework Analysis

Across the framework there is a wide spread of risks and rewards (see Fig 1.1) because of the APAC region's complex and diverse composition of markets. This suggests opportunity for private sector investors seeking investments with varying degrees of risk.

Australia is a market leader owing to a supportive environment for businesses looking to enter the market or expand operations as is politically stable, has a strong financial market, a diverse low-carbon energy market and a well-developed renewables sector. China is also an outperformer, given the opportunities presented by having the largest renewables sector. China's strong energy policy and low grid losses also feed into its high score.

Regional reliance on coal demonstrates slow regional transition, but opportunities for investment

Thermal power will account for almost 60% of power generation between 2023 and 2032 (see Figure 1.2). Figure 1.3 also shows that increasing thermal consumption will continue over this decade. However, BMI expects that the need for low-carbon energy solutions will provide plenty of opportunities to develop renewable projects across APAC's markets.

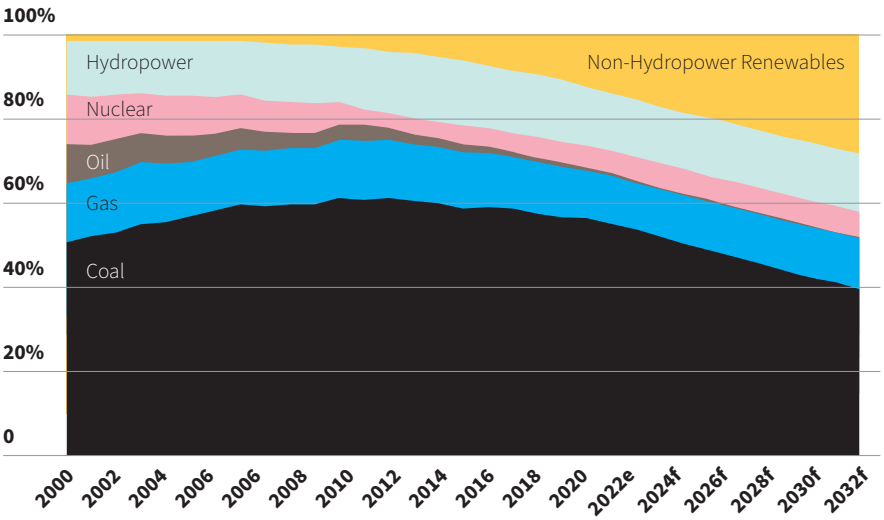
There will also be more opportunities for energy storage projects, such as pumped hydropower and battery energy storage systems, which will complement the growth of intermittent renewables and sharpen the segment's capacity to replace thermal power from fossil fuels.

Efficiency gains reduce electricity consumption per GDP

The development of the APAC region over the past two decades has increased electricity consumption, fuelled by the expansion of electrification and increased urbanisation. However, as developments in energy efficiency gain traction, notably in the region's more developed markets, electricity consumption per real GDP is expected to decline over the next decade (see Figure 1.4). Total energy consumption is expected to grow in the region by 4% year-on-year (YOY), on average, which will increase the need for clean energy investment.

Figure 1.2: High-emission power types remain dominant in regional power mix, opportunities for Low-carbon power

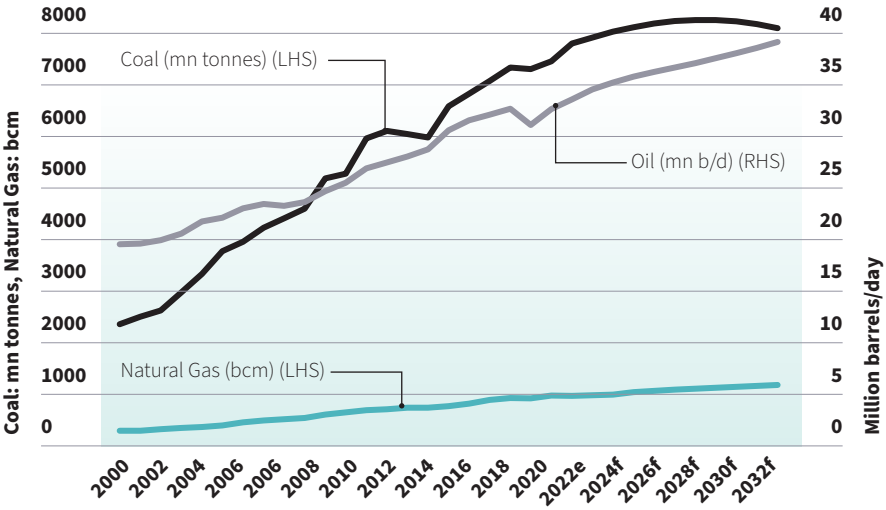
Asia-Pacific total power generation by type, % of power mix



e/f = BMI estimate/forecast. Source: EIA, IRENA, Local sources, BMI

Figure 1.3: Fossil fuel consumption in Asia will continue to rise, only coal shrinking post-2030

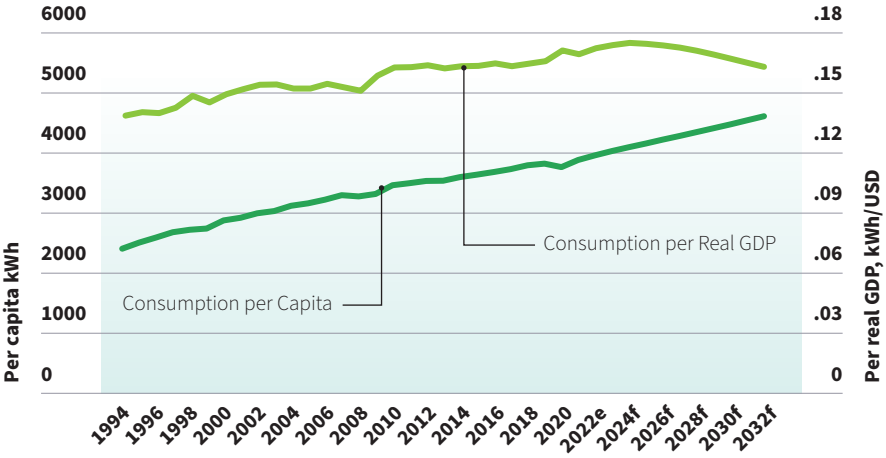
Select Asian markets total coal consumption (mn tonnes), natural gas consumption (bcm), and oil consumption (mn b/d).



e/f = BMI estimate/forecast. Source: EIA, Local sources, BMI

Figure 1.4: Asian economies grow more energy efficient

Asia Pacific regional average electricity consumption per capita, kWh, and per real GDP, kWh/USD



e/f = BMI estimate/forecast. Source: EIA, IRENA, Local sources, BMI

APAC project financing and international investment opportunities

The APAC financial sector is developing well, as shown by the financial barriers component of the framework (see Figure 1.5). This reflects a greater ability for markets to direct project financing and direct international investment to developers. The Just Energy Transition Partnerships (JET-P) are good examples of international investment schemes that will benefit from openness in the financial sectors.

JET-P is a financing mechanism being implemented by wealthier developed countries to increase the funding of clean projects in coal-reliant markets such as Indonesia and Viet Nam and presents an opportunity for renewables developers in these markets to gain access to financing.

However, JET-P will not be sufficient to support the transition in its entirety but will likely attract crowding in from the private sector. For example, Indonesia is expected to reach 11% renewables share in 2030, despite its JET-P target of 34%. The market's plan to continue building captive coal plants undermines the funding potential of JET-P. Moreover, JET-P funding will comprise a small share of grants, increasing debt for governments, while also being obscure in its application to key energy transition sectors. Private sector investment will be needed to increase funding availability to reduce emissions.

Industry rewards

This part of the framework assesses the growth of low-carbon power in each market, which includes hydropower, nuclear, non-hydropower renewables, the electric vehicle (EV) fleet, and the market's pipeline of low-carbon hydrogen and battery energy storage projects.

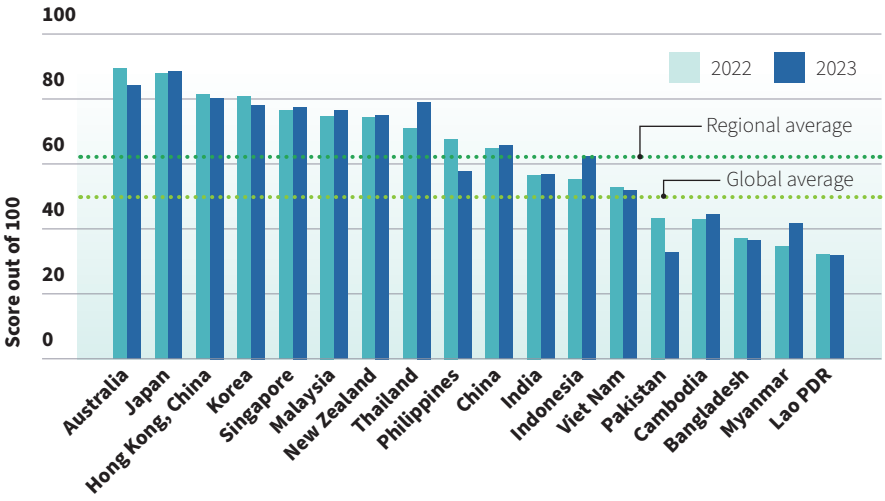
China leads the global renewables sector and is forecast to have a 40% share of the global renewables market by 2032. Meanwhile, ten out of the 18 markets score below 50 in the industry rewards index (see Figure 1.6), indicating low levels of installed clean energy, and therefore strong potential for renewables development.

Low-carbon power to grow in APAC over the next five years

Figure 1.7 shows net low-carbon capacity additions between 2022 and 2027 for markets covered by the low-carbon energy transition framework, excluding China and India. The other markets are expected to add a total of about 110GW over the coming five years. This contrasts with India's 94GW and China's overwhelming 1,093GW, which is more than 11 times the capacity of the markets listed below combined. Overall, average annual growth in the region will be about 9% from the end of 2022 to 2027, which is higher than the global average growth rate of 5.5%. Although the strong growth indicates that there is momentum behind the energy transition, the chart also highlights several markets with slower

Figure 1.5: Majority of Asian markets have above global average developed financial markets

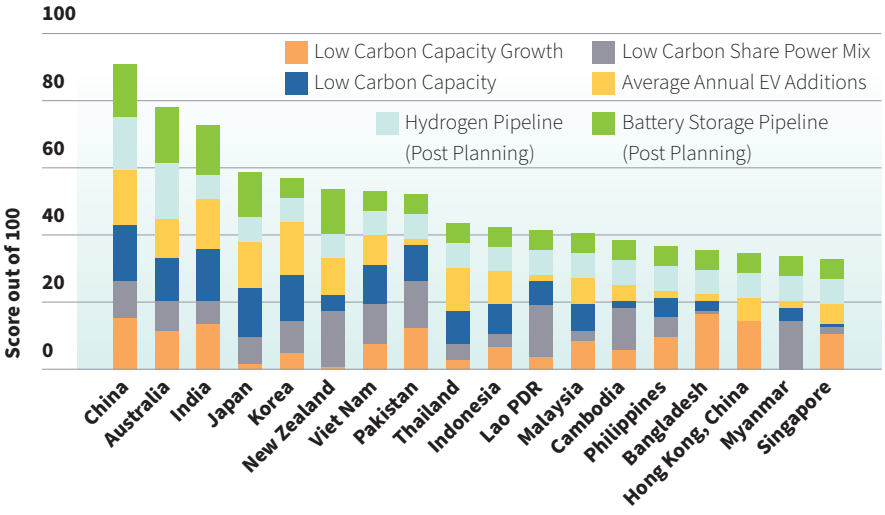
Asia Pacific financial barriers score by market



Note: Scores out of 100; higher score = more attractive market. Source: BMI Operational Risk Index
Financial barriers consider taxation levels, openness and access to funding and the sophistication of local financial systems

Figure 1.6: Industry rewards highest in China

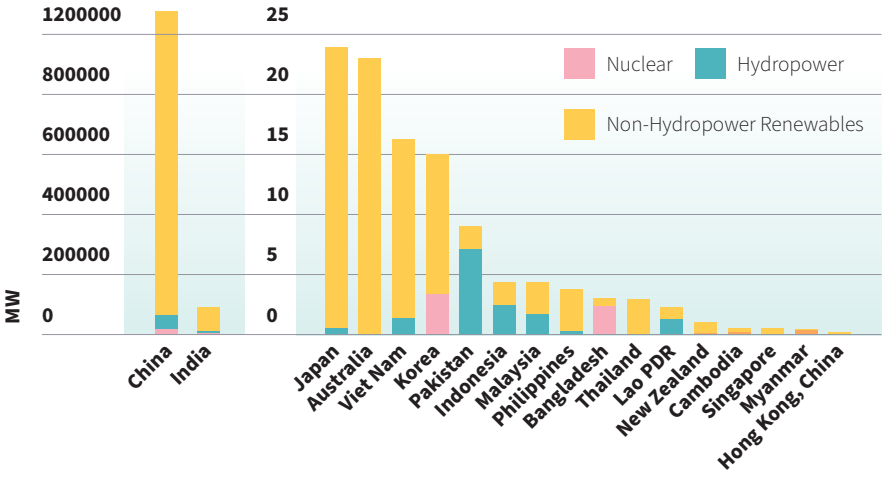
Asia-Pacific industry rewards score and weighted component scores



Note: Scores out of 100; higher score = more attractive market. Source: BMI

Figure 1.7: Strong low carbon power capacity growth increases overall performance

Asia-Pacific net low-carbon capacity additions, by market (2022e–2027f), MW



e/f = BMI estimate/forecast. Source: EIA, IRENA, Local sources, BMI

growth, which shows there are many less mature markets in the region with further potential for development. For example, Thailand will add under 5GW of capacity between 2022 and 2027, which is significantly lower than markets such as Australia, Viet Nam or China. However, the market is looking to diversify its energy mix and offers subsidies for renewable energy that make it an attractive investment opportunity.

Hydrogen storage pipelines and battery storage pipelines limited in APAC

The growth of new technologies is also included in the Industry Rewards pillar of the framework, which assesses the size of each market's hydrogen and battery pipelines, as well as the expected annual average EV fleet additions for the next five years. Korea and India are expected to have the largest average annual EV additions. However, hydrogen projects in the region are largely limited to Australia, India, and China due to the challenges of transporting hydrogen between countries with no land barriers. Japan and Korea are expected to be large demand centres, but these are geographically separated from major potential producers, such as Australia and India, presenting downside risks to projects.

The adoption of EVs will drive electrification efforts and power demand over the next five years. Twelve out of the 18 markets covered in this framework are expected to experience growth in their EV fleet from the end of 2022 to 2027. However, EV penetration is still limited currently (see Figure 1.8), at less than 3% of the automotive fleet. This is expected to reach to 10% in 2027 and 13% in 2032 which will increase the need for clean electricity to supply the grid, and grid management solutions such as battery storage, adding potential to these sectors.

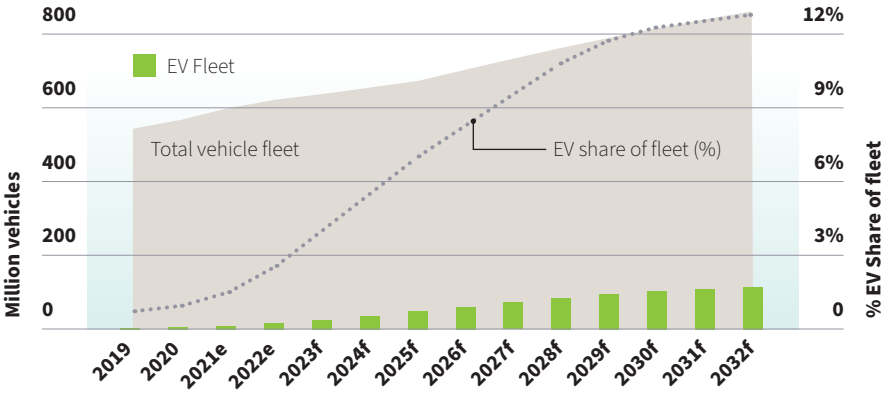
Country rewards

Indonesia and Thailand score very well in the country rewards part of the framework (see Figure 1.9) owing to their strong growth potential in the renewables sector. Indonesia's potential is driven by high consumption forecasts and its coal-fired power dominance while Thailand is a large electricity importer, leaving space for domestic growth. Both Indonesia and Thailand's power sectors present investment opportunities. This also indicates risks to energy supply as consumption growth, high emissions share and electricity import dependence will mean markets need to invest in domestic clean energy to meet demand. Energy security will be a salient aspect of the energy transition and provide impetus for clean energy investment in these markets.

The APAC region will account for the largest global additions of coal-fired power generation, which increases the high-emissions power generation share score, highlighting the dependence on thermal sources whilst demonstrating a need for investment in

Figure 1.8: EV penetration in Asia remains low

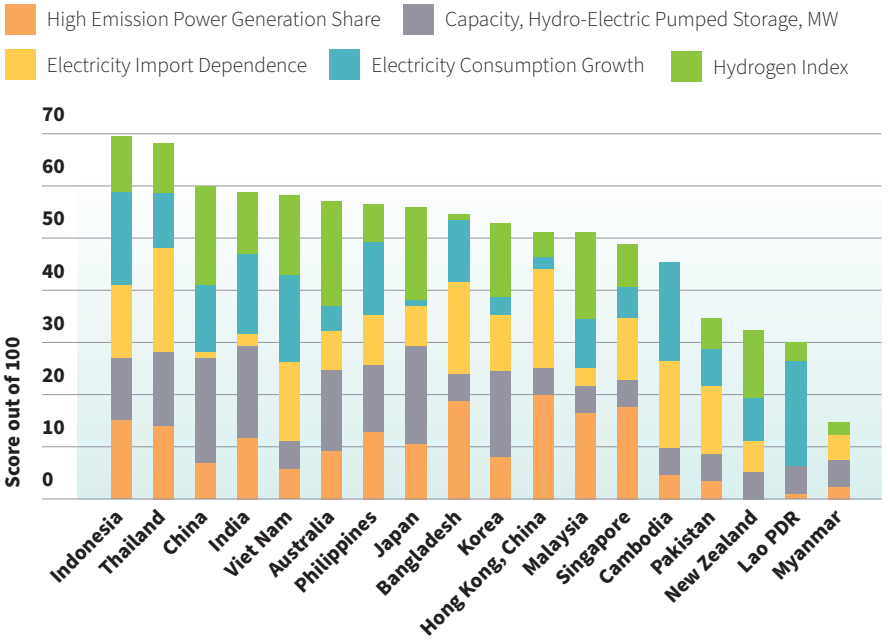
Asia-Pacific total vehicle fleet (LHS), EV fleet (LHS) & EV share of fleet, % (RHS)



*Note: This includes only passenger and commercial vehicles. This also includes data from Afghanistan; Brunei; Macau, China; and Taiwan, China. Source: Local Sources, BMI

Figure 1.9: Strong country rewards in APAC as high emissions share increase potential for investment

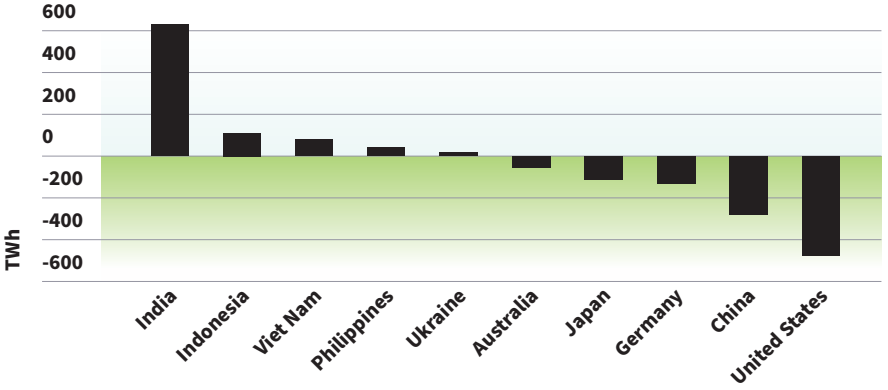
Asia-Pacific country rewards index and component weighted shares



Note: Scores out of 100; higher score = more attractive market. Source: BMI

Figure 1.10: AIIB members represent over 90% of global coal output growth

Selected markets, coal net change, TWh (2022e-2032f)



*Note: Markets presented are top five contributors and bottom five. e/f = BMI estimate/forecast. Source: EIA, IRENA, Local sources, BMIforecast.

renewables across the region. The world's top four coal growth markets are in Asia (see Figure 1.10). There are opportunities for financial institutions with mandates to spur a low-carbon energy transition across the region to reduce coal growth in these markets.

This highlights a need to focus on the markets that will experience the largest contraction of coal-fired power generation, as three of the top five are also in the region (see Figure 1.11). This demonstrates that the region also has the momentum to transition away from coal.

Industry risks

Industry risks are assessed in the framework on each power market's stage of development and each country's ability to sustain growth in its power sector. The lower the level of development and supportive policies in place, the higher the risks to businesses from an operational and construction perspective.

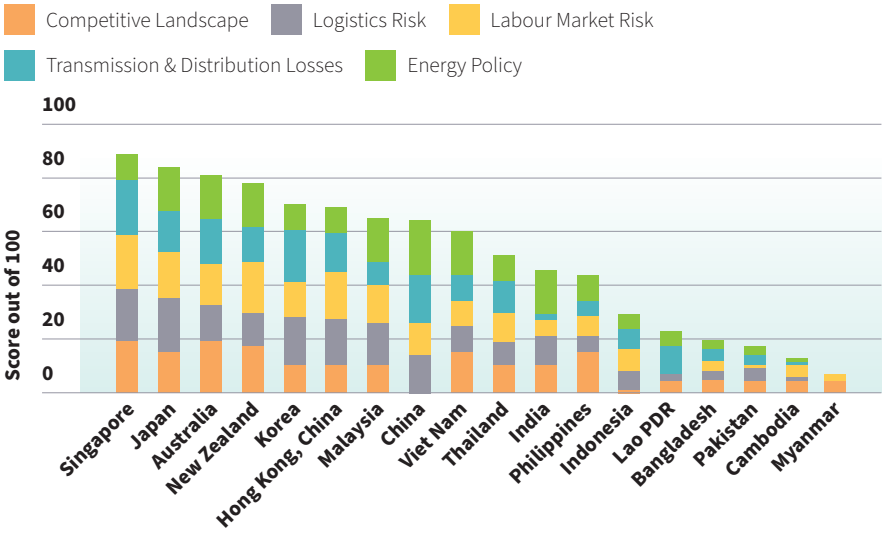
Markets with stronger country risk scores tend to maintain and expand their grid infrastructure more effectively, leading to more power sector efficiencies. This can be attributed to stable political landscapes, better-developed trade, and investment flows into the market to support power sector growth. These markets also usually have a stronger rule of law, ensuring that electricity thefts are curbed.

Labour market and logistics risks are also important indicators for a market's attractiveness for energy transition investment. Strong labour markets suggest high skills, availability of labour, and lower costs of labour. Meanwhile, less risk around logistics means broader transport and utilities networks, as well as ease of trade for a market. These are important for reducing risks and costs for projects in the sector.

The weaker utilities network scores denote that electricity utilities are costly and unreliable and present a barrier to clean technology growth in the market. This also suggests there are higher risks to energy supply and there is a need for investment in improving this network.

Figure 1.11: Developed markets are safer due to well-developed power markets

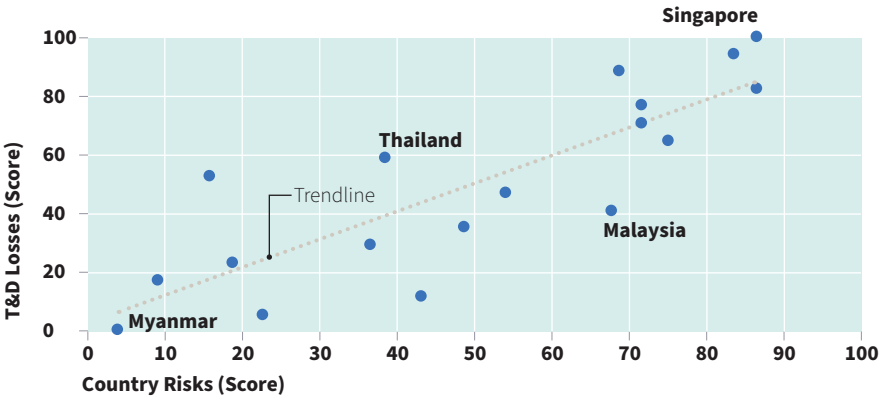
Asia-Pacific industry risks index and component weighted shares



Note: Scores out of 100; higher score = more attractive market. Source: BMI

Figure 1.12: Grid connection supported by strong country fundamentals

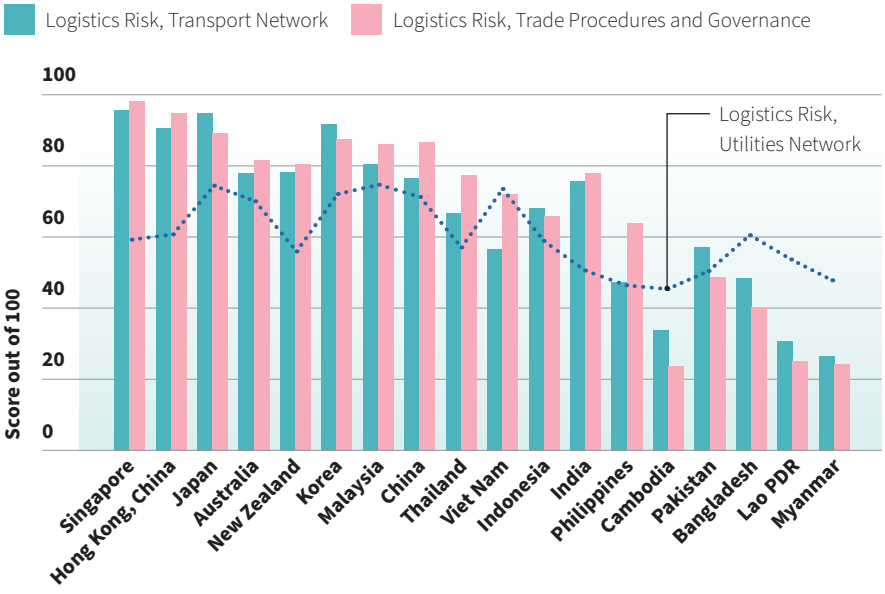
Asia-Pacific transmission and distribution losses, and country risks



Note: Scores out of 100; higher score = more attractive market. Source: BMI

Figure 1.13: Utilities network weighs on regional logistics scores

Asia-Pacific transport network (score), trade procedures and governance (score) and utilities network (score)



*Note: Utilities Network Score is also derived from water, fuel & internet utilities. Scores out of 100; higher score = more attractive market. Source: BMI

Country risks

The country risks pillar of the framework weighs each market's economic, political, and operational risks, looking at both their short- and long-term outlooks. Developed markets score better than emerging markets (see Fig 1.17), mainly attributed to their generally more stable political outlooks, and trade and investment openness. Private investors with higher risk appetites and experience in emerging markets would be suited to managing the political and economic challenges of some of the more developing markets.

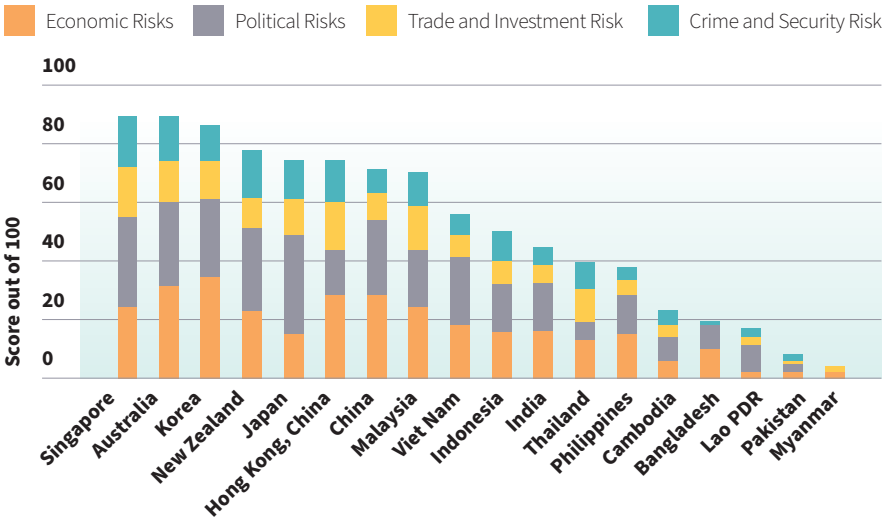
Within Southeast Asia, markets with well-developed financial systems (e.g., Singapore, Malaysia) tend to have lower risks to their economic outlook. This is supportive of the region's drive to decarbonise the power sector as more investment opportunities become available for renewable growth, which should result in a greater appetite for foreign investment to develop low carbon power projects.

Lao PDR and Myanmar have more difficult macroeconomic outlooks (see Fig 1.15). Lao PDR's large and persistent fiscal and external deficits weigh on its market score, and undermines public sector expenditure on large clean infrastructure projects. Similarly, Myanmar's low economic growth and underdeveloped financial market increase the economic risks of investment into the energy sector. These markets require private sector investment to fund clean projects.

Markets with the lowest economic, political, and operational outlooks also tend to have the lowest government spending per capita (see Fig 1.16). This indicates that riskier markets have lower public spending on goods and services such as clean energy, which makes private financial institutions important stakeholders in stimulating clean energy growth.

Figure 1.14: Developed markets lead

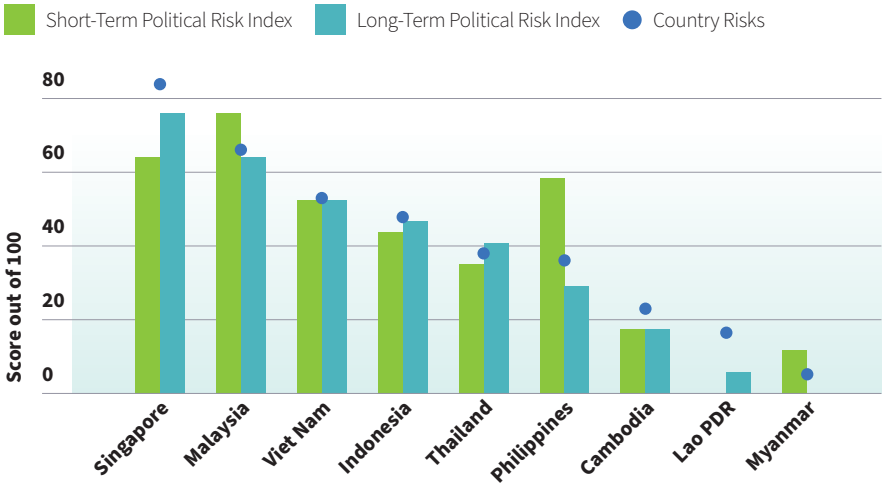
Asia-Pacific country risks score and component weighted scores



Note: Scores out of 100; higher score = more attractive market. Source: BMI

Figure 1.15: Risky Economic outlook weighs on power sector growth prospects

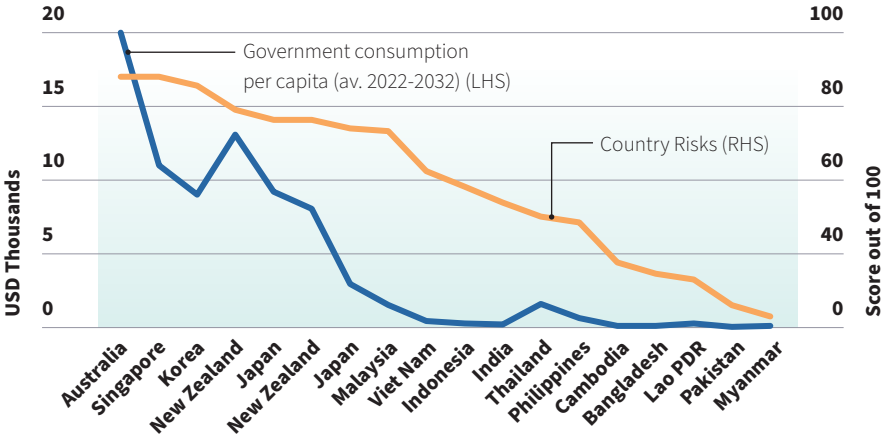
Southeast Asia country risks score by market and economic risk indicators



Note: Scores out of 100; higher score = more attractive market. Source: BMI

Figure 1.16: Higher government spending in developed markets

Asia-Pacific government consumption per capital (av. 2022-2032) and country risk scores (RHS)



*Government consumption per capita refers to all government spending, including on government community services.
Note: Scores out of 100; higher score = more attractive market. Source: Local Sources, BMI

Opportunities

Although there is a wide spread of risks and rewards across the diverse mix of markets in APAC, this offers financial institutions a range of opportunities for investing in the energy transition. Unsurprisingly, the framework reveals the more developed markets offer investors a low-risk environment, with these countries presenting lower operational risks and a more stable political environment. This is also indicated by a better quality of infrastructure, such as in the grid, thereby reducing potential investment losses. However, markets such as Thailand, Indonesia, China and India score strongly on rewards, because of the growth opportunities. Therefore, financial institutions can play an important role by providing targeted private capital.

The APAC region offers a strong investment opportunity as many markets still rely heavily on coal. The markets in this report, excluding Japan, account for 90% of global coal output growth. To replace this increasing coal share, investment in low-carbon technology will be required, adding opportunity for renewables growth. Moreover, consumption growth scores are high in the region, indicating an elevated demand for new power projects, and demand for renewable technology. Opportunities in the region are greater for established power technologies, such as hydropower and non-hydropower renewables, whereas new technology pipelines are still limited to a few countries. This is largely due to barriers, such as transport infrastructure and market regulation, which pose higher risks to investors in the new technology space.

Low-Carbon Energy Transition Framework Indicators

Indicator	Source	Rationale
Industry Rewards		
Low-carbon capacity	BMI Power Forecast	Installed power capacity indicates market size and scale of operations. The larger the sector, the greater the opportunities available. MW, five-year average forecast.
Low-carbon capacity growth	BMI Power Forecast	Changes in installed power capacity indicate potential for business opportunities as a reflection of the market rate of expansion. % change y-o-y, five-year average forecast.
Low-carbon share of power mix	BMI Power Forecast	Higher share indicates the market's scale and expertise in operations. The larger the share, the greater the ability. %, five-year average forecast.
EV annual additions	BMI Autos Forecast	Changes in the adoption of EVs indicate the potential for increased low-carbon power demand to expand electrification and reduce transport emissions, reflecting business opportunities. Five-year average forecast.
Low-carbon hydrogen pipeline capacity (post-planning)	BMI Key Projects Database	Indicates the market's progress in developing low-carbon hydrogen production. The higher the capacity, the further advanced the market.
Battery storage pipeline capacity (post-planning)	BMI Key Projects Database	Indicates the market's progress in developing alternative energy storage. The higher the capacity, the greater the market's ability to integrate more renewables.
Country Rewards		
High-emission power share of mix	BMI Power Forecast	Higher share indicates market opportunities for low-carbon power to phase out fossil fuels. %, five-year average forecast.
Pumped hydropower storage capacity	BMI Power Forecast	Installed storage capacity indicates the market's ability to integrate more intermittent renewables. MW, five-year average forecast.
Electricity import dependence	BMI Power Forecast	Higher exposure to power imports implies a lower level of energy security and provides more incentive to build domestic power capacity.
Electricity consumption growth	BMI Power Forecast	The more substantial the growth rate, the greater the demand for additional power generation. % change y-o-y, five-year average forecast.
Hydrogen index	BMI Hydrogen Index	Reflects the market's suitability for the development of a low-carbon hydrogen industry. The higher the score, the greater the market's suitability.
Industry Risks		
Competitive landscape	BMI Subjective Indicator	Assesses the openness of the power and renewables competitive landscape. Considers saturation of the existing market, its ability to compete in fair tenders, and barriers to international companies entering the market.
Logistics risk	BMI Operational Risk Index	Evaluation of the quality and coverage of the utilities, transport and trade infrastructure, including the costs and potential obstacles to business activities.
Labour market risk	BMI Operational Risk Index	Evaluation of the risks surrounding employing workers, including the education level of the labour force, availability of suitable workers, and employment costs.
Transmission and distribution losses	BMI Power Forecast	Provides an indication of the quality and efficiency of power infrastructure. The higher the losses, the lower the quality of the power supply. % of total power output, five-year average forecast.
Energy policy	BMI Subjective Indicator	Assesses the market's position in relation to the competing goals of energy security, power sector decarbonisation, and economic sustainability, as well as energy policy continuity.
Country Risks		
Short-term economic risk index (STERI)	BMI Country Risk Index	The STERI defines current vulnerabilities and assesses real GDP growth, inflation, unemployment, exchange rate fluctuations, balance of payments dynamics, as well as fiscal and external debt credentials over the next two years.
Long-term economic risk index (LTERI)	BMI Country Risk Index	The LTERI explores the structural characteristics of economic growth, the labour market, price stability, exchange rate stability, and the sustainability of the balance of payments, as well as fiscal and external debt outlooks for the coming decade.
Short-term political risk index (STPRI)	BMI Country Risk Index	The STPRI assesses pertinent political risks to the stability of the investment climate over a two-year time frame.
Long-term political risk index (LTPRI)	BMI Country Risk Index	The LTPRI assesses a country's structural political characteristics over a multi-year timeframe.
Trade and investment risk	BMI Operational Risk Index	Evaluation of the openness of an economy, the level of banking and taxation sophistication, and the effective functioning of the legal and bureaucratic systems.
Crime and security risk	BMI Operational Risk Index	Evaluation of potential security risks stemming from terrorism, political violence, war and criminal activities, weighed against the government's capacity to protect against these threats.

Sector level analysis

Fitch Solution applied the CCIF to four sectors of economic activity, each with a different role to play in the transition.

- **The auto sector provides an example of a sector that needs to shift its whole business to new product ranges**, and this process is already well underway for most entities operating in the sector.
- **The tech-electronics and the healthcare sectors are not material GHG emitters and technologies are established to cut their direct emissions**. Both sectors still have a role to play in a net-zero economy but their business models are not directly impacted by the transition. The tech-electronics sector is seen as an enabler as it can deliver new technology solutions to help the rest of the economy become energy efficient.
- **Basic industries provide a typical example of a hard-to-abate sector**, for which technological and economic feasibilities are known challenges to the transition.
- **Across these four sectors, there is a shortfall in data being reported on ESG.** There should be a move towards an integrated policy-driven approach to the imposition of data reporting standards across all these sectors. A regional – or even-sub-regional – framework is required so that governments take a more uniform approach to data reporting.

Autos index

Using the CCIF, the autos index aims to capture the extent to which the operations, investments and strategies of companies operating in this sector align with the Paris Agreement goals of mitigation, adaptation and contribution to the transition. A fourth dimension, financial capability, was added to the CCIF to assess a company's financial strength and ability to deliver on its climate objectives.

Mitigation

Assessing an auto company's mitigation effort with respect to GHG emissions should encompass two different angles: the emissions impact of the company's products and its operations. While public attention tends to focus on the vehicles produced and the electrification strategies of a company, vehicle manufacturing and delivery of the product are energy-intensive processes which also require attention. Where companies are actively reporting emissions data for both product ranges (in the case of carmakers) and business operations, this is relatively transparent. However, evaluating the potential efficacy of corporate net-zero carbon goals (where applicable) and assessing the sustainability approach of companies can be subjective.

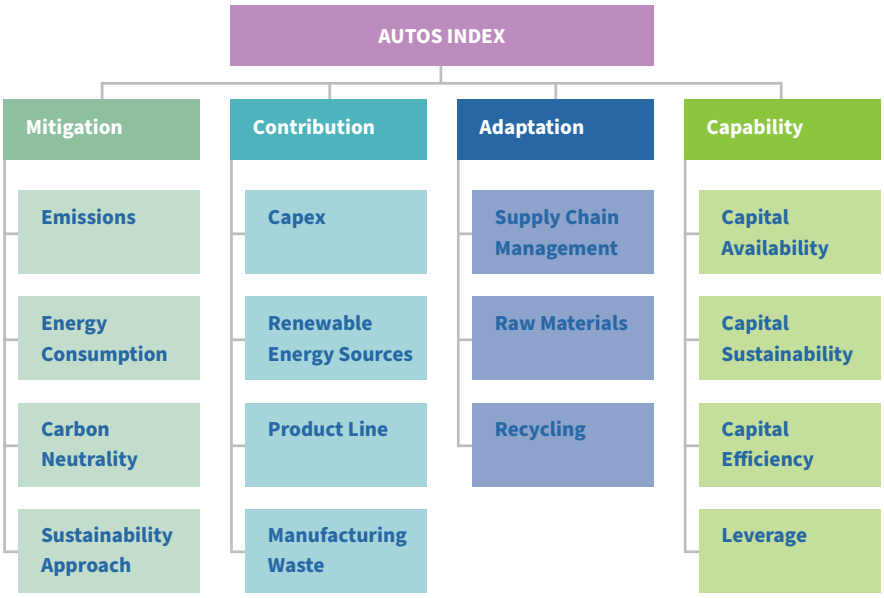
Adaptation

In a mature industry such as the auto industry, the adaptation pillar represents one of the greatest challenges as it encompasses changes being made by companies to limit future environmental damage, particularly in relation to the supply chain. The shift to EVs requires new metals for batteries and the associated mining process to retrieve them. Therefore, this pillar considers sustainability initiatives related to sourcing components and raw materials, as well as investing in measures such as recycling to reduce the demand for new mining. This is also an area where digitalisation could play a bigger role as technology such as Blockchain can be used to track the journey of components, enabling Original Equipment Manufacturers (OEMs) to be more pro-active in ensuring their suppliers align with their values. One such example is Volkswagen, which announced in 2019 it would use Blockchain to increase transparency in its raw materials supply chain, ensuring metals are mined with minimal environmental impact.

Contribution to the transition

The product lines of autos companies play a key part in the green energy transition and can be relatively easy to track by measuring the proportion of a company's product range which is low or zero emission vehicles, whether that be electric or another technology such as hydrogen fuel cell, and related components for those companies in the supply chain. However, this pillar of the tracker also considers contributions to the transition from the manufacturing process, such as the use of renewable energy to power facilities and efforts to reduce manufacturing waste, which are not always as widely reported.

Auto sector tracker



Context: Auto firms centre stage in decarbonisation efforts

The auto industry is a leader in the move to decarbonise as it is one of the most recognisable sources of emissions for the public and one in which they can influence as consumers. According to data from the World Resources Institute (WRI) road transport accounts for around 12% of annual global GHG emissions and 60% of that total comes from passenger vehicles.[4] The Covid-19 pandemic underlined the extent of the transport sector's impact as heatmaps were produced showing the intensity of emissions before and during lockdown when there was little to no traffic on the streets. For many, these images better contextualised the need to decarbonise than pure data and so it is not surprising that many governments and local authorities subsequently stepped-up regulatory efforts relating to emissions or maintained those measures that had been introduced during lockdown. Paris, for example, expanded its network of bike lanes during lockdown and kept them in place as the city re-opened to encourage more cycling and walking.

The European Union's (EU) Next Generation EU package is an example of an institution using regulation and funding to do double duty in both revitalising the economy after the lockdown period and accelerating the green transition towards the bloc's goal of reducing emissions by 55% by 2030. The Fit for 55 package included legislation to strengthen emissions reduction targets for vehicles, ultimately leading to a goal of all new cars and vans sold being zero-emission by 2035. This, in turn, prompted several national level incentive packages to encourage sales of low and zero-emission vehicles, such as France's 'bonus ecologique' and Spain's 'MOVES III' plans, as well as goals for phasing out internal combustion engine (ICE) vehicles, which has spurred record levels of investment into EVs and other low emission vehicles and given consumers the opportunity to play their part in the transition.[5,6]

However, while the transport sector is the second largest contributor to global GHG emissions, according to the WRI data, the leading contributor is 'energy used in industry' and as a highly energy-intensive industry, the auto sector is increasingly turning its attention to manufacturing operations as well as products. This element of emissions reduction is less likely to be driven by consumers and brand preference, instead linked to incentives for using renewable energy or lowering energy usage. This presents an opportunity for policy makers to intervene, although companies' net zero strategies are becoming broader in scope to cover these various elements voluntarily.

Auto companies face triple threat in energy transition

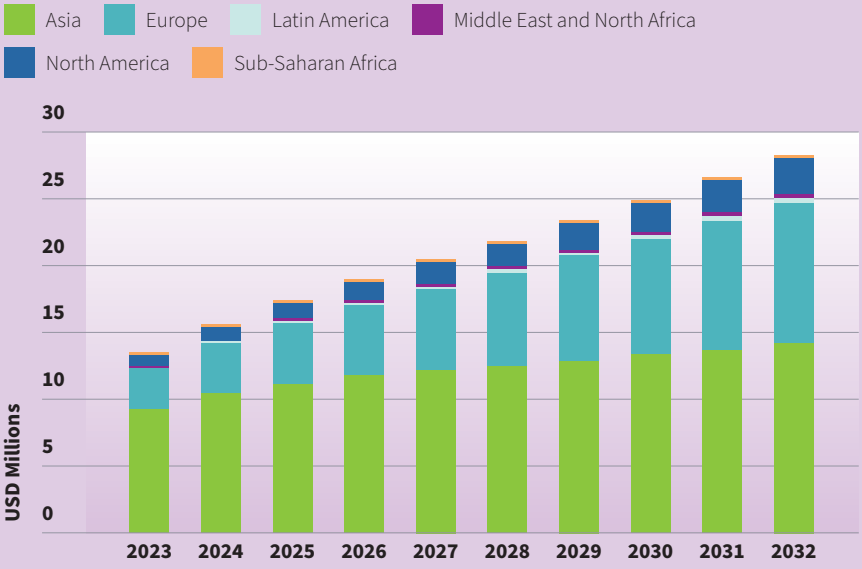
The increasingly broad strategies deployed by auto companies speak to the variety of challenges they face in reducing emissions across all business areas. For the purposes of evaluating these challenges and means of addressing them, three headline categories are examined – product, process and supply chain. These encompass the main levers available to autos companies to address the green transition.

Product

A combination of regulation and consumer demand have accelerated the drive toward electrification, which has resulted in billions of dollars in investment into the manufacturing of EVs and related components, as companies have committed more fully to the transition. Impending internal combustion engine (ICE) bans or goals to reach 100% emissions reductions have become increasingly commonplace as governments and authorities attempt to meet the goals of the Paris Agreement.

The EU has set a goal of phasing out sales of new ICE vehicles by 2035, China is aiming for 20% of new sales to be 'new energy vehicles' by 2025, while the US is aiming for half of new light vehicle sales to be electric by 2030. These markets are understandably among the projected leaders in EV adoption, although this kind of regulation must be complemented by adequate charging infrastructure and financial incentives for consumers to address the dual concerns of range anxiety and cost.

Figure 2.1: Global – Electric vehicle sales by region, 2023-2032



Source: Fitch Solutions forecasts

According to Fitch Solutions forecasts, EVs will account for 23% of global passenger vehicle sales by 2030.[7] Europe will be the clear leader on a regional basis with a 42% penetration rate, largely due to EU policy, although other key markets outside of the EU such as Norway and Sweden have equally if not more supportive policies and will have penetration rates far above this projected regional average (79.6% and 82.8% respectively). In volume terms Fitch Solutions' forecasts show Asia leading with a market of 13.2 million units out of the 24.8 million units being sold globally by 2030.

However, China will account for the lion's share of that Asian market with 11.5 million units, having been an early mover in terms of offering the kind of comprehensive supportive policy that is required, as well as an industry offering models at all price points to improve accessibility. Therefore, based on penetration and market volume, companies with exposure to Europe and China will play a bigger role in the industry's low carbon transition.

Road freight accounts for 40% of the total road transport emissions, which means that

manufacturers of trucks and vans must also act. While the number of electric models in all commercial vehicle segments is increasing, it is not always the best fit for the purpose. The long distances travelled and the need to recharge quickly are challenges for current battery EVs. Therefore, hydrogen fuel cell electric vehicles (FCEV), while available for all segments, including cars, will likely have the best use case in the road freight sector. They will enable longer distances travelled on a single tank and quicker refueling.

However, FCEVs have drawbacks, including the cost and complexity of building out the refueling network. There has been government support in this area, particularly in those markets that produce hydrogen and see the opportunity to create a source of demand through growing the FCEV market. Fitch Solutions believes that Asia will be a global leader in hydrogen FCEV adoption in the short to medium term due to the incentive programmes of key markets in the region, and the market-leading position of the region's automakers in developing hydrogen FCEVs. Specifically, Korea will be the largest hydrogen FCEV market in the region, primarily because it has been the first to roll out strong purchase and development incentives. Fitch Solutions forecasts the FCEV fleet in Korea to surpass 100,000 units by 2026, accounting for just over half of the total Asian fleet. North America will be the second-largest regional market, supported largely by provisions for clean hydrogen projects in the Inflation Reduction Act (IRA). While Europe has an equally supportive policy backdrop through the EU Green Deal and Next Generation EU packages, the region will not become a larger force in the market until after 2030. Fitch Solutions believes that Europe will initially focus on developing domestic green hydrogen production capacity before shifting its attention towards the domestic refuelling network, which will then provide a solid foundation for stronger FCEV sales growth post-2030.

Process

While the growing adoption of EVs has been the centrepiece of the auto sector transition, sustainability efforts in other areas of the vehicle's life cycle, such as manufacturing and maintenance, are less obvious but gaining momentum. As these activities are less public, they are driven more by the companies themselves, and in some cases government regulation, rather than direct pressure from consumers; although it is fair to say that consumers are now much more informed about the companies they choose to buy from, which is likely to be a consideration for carmakers. Either way, renewable energy and other measures to make the manufacturing process cleaner are being deployed.

This is not just a developed market trend; in some emerging markets regulation has been prompting carmakers to use renewable energy for their factories. As far back as 2012, Daimler opened a commercial vehicle plant in Chennai, India, which included a solar complex to generate at least part of its electricity. Daimler was obliged to undertake some investment in solar energy due to producing in the state of Tamil Nadu, which had set a solar power generation target. Power consumers within special economic zones and IT parks, industrial consumers, and a range of other large-scale power users had to use a certain proportion of solar power.

There are other drivers of renewable use as well as regulation, however. The business strategies of utilities are also changing to encourage more of these industrial projects through the contracts they are offering, with Power Purchase Agreements (PPAs) becoming particularly popular in the USA. As an example, Ford reached a deal with DTE Energy in 2019 to acquire 500,000 megawatt hours (MWh) from the utility to be used at its Dearborn Truck Plant and its Michigan Assembly Plant, where solar power generating capacity is already installed.[8] PPAs enable companies to access energy at a predictable price and costs which are increasingly competitive with conventional power sources, which is driving more industrial users toward renewable energy.

There are several positive implications of this shift towards renewable energy for vehicle manufacturing, aside from just a reduction in emissions. Firstly, having lower and more predictable energy costs through the PPA model helps companies reduce and better manage their costs at a time when other costs are increasing. Secondly, having one carmaker in the area implementing this strategy creates opportunities for the utility to replicate the model with other companies, which could in turn lower costs for all involved through economies of scale. The overall impact is lower emissions in the local manufacturing industry.

Supply Chain

As with the auto industry transition in general, sustainability related to the supply chain can be divided into different elements, (i) more active monitoring of suppliers to align standards; (ii) use of low-emission vehicles in the supply chain; and (iii) shortening the supply chain to reduce carbon footprint. Despite the disruption caused by the Covid-19 pandemic to deliveries, it has catalysed many entities to rethink their sourcing and reset, particularly as strategies such as re-shoring and near-shoring have the added benefit of reducing both distances travelled and resulting emissions.

New technology also offers companies the best chance yet of being able to more closely monitor their supply chains to ensure that their partners and the methods they employ align with their own strategies and standards. Blockchain is one example of a technology being increasingly used by autos companies to better track the journey of key components and materials. This means that even suppliers, who are not as directly impacted by consumer pressure, will need to have more sustainable practices in place if they are to retain business with vehicle manufacturers that have their own stringent transition strategies in place. Ultimately this should have a positive compound effect on the industry's green transition.

Similarly, if companies are considering the whole journey of their supply chain they must also include their own deliveries, which means the industry can simultaneously create a demand channel for EVs and other low- or zero-emission vehicles, as well as supplying them. In April 2023, Swedish commercial vehicle manufacturer Scania launched the first electric car transporter, while electric vans and trucks are being increasingly deployed by OEMs for deliveries of smaller goods between factories or to retailers.[9] Suppliers are also partnering with logistics firms that have committed to using EVs in their fleets.

Indeed, these 'last mile' journeys will become increasingly important in terms of reducing the emissions in a company's supply chain as the growing trends of near-shoring and re-shoring cut down the overall distance to be covered and put emphasis on the last stage. While it was the pandemic's disruption that first made companies aware of the need to reduce their dependence on other regions, most notably Asia, it is now government policy supporting ongoing efforts to make industries more self-sufficient in key autos markets such as Europe and North America, particularly the EV sector and related supply chain. Although geopolitics has been a big driver of these policies, they will undoubtedly have a positive added effect of reducing the sector's carbon footprint.

Opportunities

There are so many areas in the auto sector where decarbonisation efforts are required, that successful companies can play a central role in the industry's low carbon transition. However, the need to measure the progress of that transition increases the importance of robust and transparent data reporting, particularly when companies are becoming reliant on other partners to meet their sustainability goals, such as decarbonising their supply chain.

The Autos tracker highlights a need for more thorough and transparent reporting. Companies that have a focus on the green energy transition by virtue of their product line (i.e., EV or battery manufacturers) were penalised for not reporting on several of the indicators , and as a result, ranked below companies with low to medium scores for many categories but that had reported across all indicators. Another discrepancy is between reporting goals and the data required to measure them. For example, some companies score well under the 'Carbon Neutrality' indicator, which assesses their commitment to setting carbon neutrality goals and measures to enforce them, but they scored 0 for their emissions because they did not report them, making it hard to evaluate their success in meeting these carbon neutrality goals.

From an investor perspective, the 'Capability' pillar of the index is particularly important as this evaluates a company's ability to fund its transition efforts. The levels of investment going into areas such as EV and battery production, mining, and recycling show that it will be an expensive process and the payoff is not immediate. On the positive side, this pillar comprises more consistently reported financial indicators, making it much easier to track and to compare companies. One of the differentiating factors on the financial side, which is not tracked, is the variation in financial support across different markets, both in terms of incentives for setting up manufacturing, and for consumers to purchase the finished products. This is when the geographical exposure of companies and their future expansion plans will come into play. China has been the clear leader in this respect, both regionally and globally, having had incentives for NEVs in place for well over a decade. According to an MIT report, China spent over CNY200bn (USD29bn) on NEV-related subsidies and tax breaks for both consumers and manufacturers between 2009 and 2022.[10] In June 2023, the government went a step further with a package worth CNY520bn (USD72.3bn) to cover purchase tax breaks for NEVs for the next four years.[11]

However, not all markets in the region will have the fiscal firepower to provide this level of support. Thailand, which has a goal of transitioning 30% of its local vehicle production to EVs by 2030, is focusing on encouraging domestic production and the use of local content. The government is offering tax holidays to manufacturers of EVs, components, and charging stations, as well as subsidies of between USD2200 and USD4800 for purchases of EVs depending on the model. As far reaching and comprehensive as the policy is, however, the government approved a funding package of just THB2.9bn (USD83m) in 2022, which is a fraction of the support on offer in China, even accounting for different market size.

Technology-electronics sector tracker

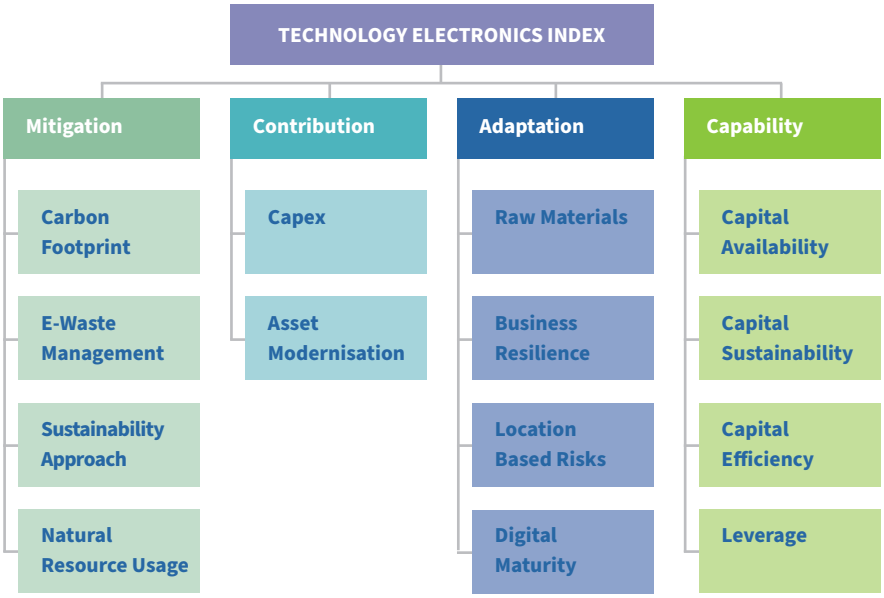
Technology-electronics index

Using the CCIF, the tech-electronics index aims to capture the extent to which operations, investments, and strategies of companies operating in this sector align with the Paris Agreement goals of mitigation, adaptation, contribution to the transition, plus financial capability.

Mitigation

The tech-electronics companies assessed under the CCIF are, in the main, either original design manufacturers (ODMs) or OEMs that produce software or hardware (components or finished goods) for themselves or other parties positioned up or down the value chain. Manufacturing is both raw material- and energy-intensive and efforts aimed at mitigating climate change tend to pivot around the more directly controllable aspects of production, namely carbon emission reduction and the management of product end-of-life waste materials (e-waste). The sustainability of operational activities, such as product packaging and distribution, is also being tackled with alternatives to plastic packaging. Notably, over the last five years, OEMs and ODMs have been making considerable efforts to collect data regarding raw material and power consumption and sourcing (scope 1 and scope 2), as well as scope 2 and scope 3 contributions from sub-contractors and customers. This has enabled companies to construct and implement wide-ranging mitigation plans, with both short- and long-term objectives.

Technology Electronics Index composition



Adaptation

The tech-electronics sector's high dependence on raw materials and the need to keep production costs low means that the adaptation pillar poses one of the biggest challenges in the transition process. The most potent challenge is that of raw material consumption: electronics remain highly dependent on rare earth elements (REEs), metals, minerals, and chemicals. These may be used directly, as conductors or agents, or indirectly as part of the manufacturing process. While REEs are abundant and key metals and minerals remain in reasonably good supply, companies must look to improve supply chains with regards to ethical sourcing (this may range from considering treatment of mining companies' employees (a particular example being heavy manual workers exposed to heat stresses in hotter climatic conditions), the impact of resource extraction on local communities and the environment and dealings with disreputable governments and agencies).

Context: **Location and mobility key to adaptation**

The tech-electronics tracker assesses key companies' location-based risks within the adaptation parameters of the Paris Agreement, which include their ability to enhance adaptive capacities, strengthen their resilience and reduce their vulnerability to climate change. None of the surveyed companies scored less than 50 points, but this may be because all of the companies in question are large and well-dispersed, with key manufacturing, management, and distribution centres spread across a wide area of Asia and the world. This gives them considerable operational resilience, enabling them to switch production from one market to another should the local political, economic or environmental conditions change. A major test of that resilience came with the COVID-19 pandemic, with the software-focused players most able to adapt to a remote working environment and able to rapidly scale staffing and computing resources to meet increased demand from clients.

The manufacturing base's critical weakness – its dependence on China as the pre-eminent manufacturing hub – was exposed during the pandemic. The sector was able to leverage well-supplied inventories to weather the worst of the crisis. However, supply chain bottlenecks quickly emerged and, as of late 2023, demand continued to outstrip supply, particularly in the high-end semiconductors field where car manufacturers are particularly exposed.

The tech-electronics companies surveyed by the CCIF tracker are also generally located close to important logistics hubs, which adds further resilience as rail, air, road and maritime transportation are all key to the sector's ability to secure resources and export finished goods. For the most part, the surveyed companies were based in areas less likely to be affected by rising sea levels or extreme weather conditions such as drought and flooding.

Notably, however, it is the legion of small, privately-owned or large state-owned manufacturers that are more exposed to location-based risks. These entities tend to be in older cities where only older weather defences exist or which are likely to come under threat from rising sea levels over the coming decades. These entities typically lack the financial resources to restore facilities following weather-related damage or to relocate to more secure locations even if given ample time to do so. These companies are not covered by the tracker, owing to a lack of data and, thus, present a hidden risk.

The CCIF tracker also assesses the digital maturity of the key markets in which the surveyed companies are based or where they are most active. This considers access to high-speed wireless and fixed Internet connectivity, proximity to high-capacity submarine cable or satellite systems and access to high performance computing ecosystems to support current or future cloud-based business processes. Mirroring the findings of the location-based risks, the tracker focused on the larger, internationally focused players which have become dependent on digital connectivity, so the scores in this field are perhaps overly optimistic. Smaller privately-owned players and state-owned enterprises tend to be less engaged with digital solutions, owing to limited cashflows or the reliance on physical or analogue business processes.

Context: **Mitigation efforts centre on e-waste**

The tech-electronics sector depends on a set of highly diverse and global supply chains populated by a very broad mix of contributors, which can be challenging for individual companies implementing climate-change mitigation practices. The ecosystem ranges from small privately-owned entities with low margins and limited cashflows to large state-owned enterprises that may be dependent on unreliable government financing or constraints on their ability to adapt and innovate.

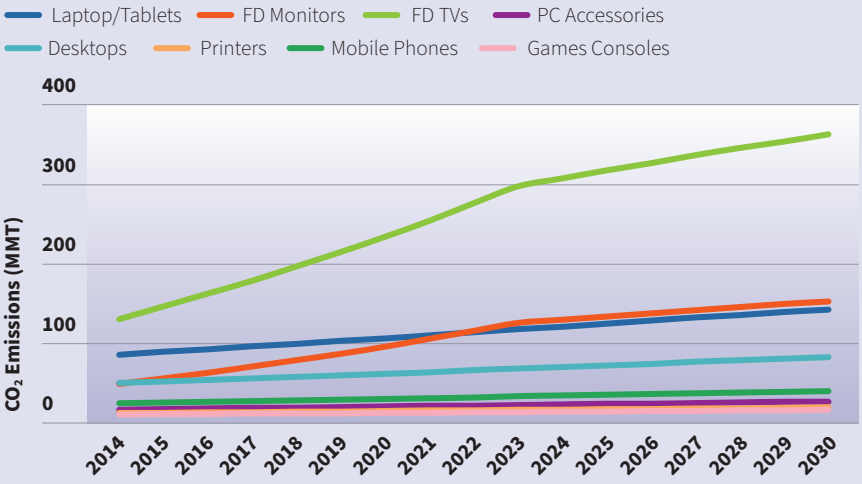
In the middle, and accounting for most of the sector, are companies that are listed, which enjoy a large (regional or global) presence and access to somewhat reliable revenue streams. However, they more often bear the brunt of government, regulator and consumer scrutiny. Increasingly, these mid-tier companies are facing shareholder scrutiny and criticism where recent or ongoing climate change responses might be viewed less favourably vis-à-vis other, nimbler sectors.

Most of the scrutiny surrounds carbon footprints and waste management. The companies covered in the CCIF tracker have typically been monitoring their activities and impacts in these areas for five years or more and are beginning to make performance data available to regulators and the investor community. Invariably, every company takes a different approach to defining and quantifying the various elements making up their impact footprints, but the sharing of information in public and regulatory fora is beginning to yield a degree of standardisation. It has resulted in the greater availability of book-of-materials and device life cycle records for analysis.

A study carried out by the University of California, Irvine (UCI), which was published in 2022, found that GHG emissions associated with the production, usage and disposal of electronic devices increased by 53% between 2014 and 2020.[12] Approximately 580 million metric tons of (MMT) CO_2 were discharged into the atmosphere in 2020 alone. The researchers concluded that, without adequate regulation or a legal framework to extend the useful lives of electronic devices, more than 850 million tons of CO_2 compounds will be emitted annually from e-waste sources by 2030. Such devices would account for approximately 0.99% of global CO_2 emissions by 2030 (up from 0.44% in 2014).

Based on analysis of 1,003 life cycle reports from different manufacturers, it was found that flat-screen TV sets (FD-TVs) were associated with the highest emissions (41% of total cumulative emissions), followed by laptops/tablets, flat-screen computer monitors, desktop computers, mobile phones, computer accessories, printers, and games consoles.[13]

Figure 2.2: Sources of CO_2 emissions 2014-2030 (millions of metric tons, MMT)



Source: University of California, Irvine

Using these same reports, the UCI researchers concluded that, if the useful lifetime of electronic devices were extended, there could be a substantial reduction in CO_2 emissions. Multiple scenarios were modelled, but the scenario of a 50-100% increase in the useful lifetime cycle would see the prevention of 19-28 MMT of e-waste related CO_2 emissions over the 2015-2030 timeframe. This would pivot around the well-recognised, and increasingly implemented, approach known as reduce, reuse and recycle (3re).

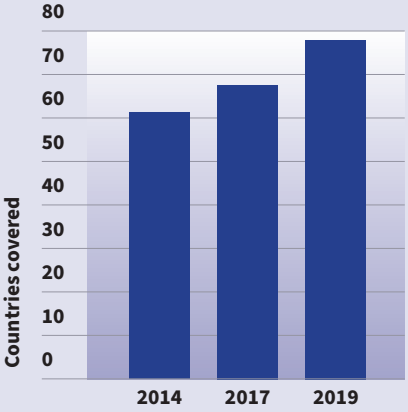
There is a laudable effort to tackle the biggest challenge for the tech-electronics sector. According to the International Telecommunication Union's 2020 Global E-Waste Monitor, a total of 53.6MMT of e-waste was generated worldwide in 2019, an increase of 9.2MMT from the volume recorded five years earlier.[14] The report predicted that global e-waste volumes will reach 74.7MMT by 2030, almost double the 2014 figure, fuelled by higher electric and electronic consumption rates, shorter lifecycles and limited repair options.

The 2020 report noted that the number of countries that had adopted a national e-waste policy, legislation or regulation had increased from 61 to 78 between 2014 and 2019. In many regions however, regulatory advances were seen as being slow, enforcement was low, and collection and proper e-waste management was poor.

An update to the Global E-Waste Tracker is expected in December 2023; while the ITU had not set out its findings at the time of writing, it seems likely that momentum will have been lost owing to the global Covid-19 pandemic and heightened geopolitical tensions that have disrupted supply chains and seen key manufacturing centres set aside climate mitigation concerns in pursuit of both restored economic growth and political/technical superiority.

Whereas the CCIF tracker found that many Asian technology companies were making reasonable progress in dealing with e-waste, it also found that relatively few scored well in terms of mitigating the sector's impact on natural resource usage. Metals such as gold, nickel and copper are intensively used in electronics, and while there is no immediate shortage of resources, key deposits are finite and the largest are in increasingly politically and ethically challenging locations for global players. A redrawing of the global political stress-lines, as the global order gives way to a multi-dimensional multipolar world presents considerable operational difficulties for Asia-based companies and those they do business with across the value chain.

Figure 2.3: Global e-waste regulation adoption, 2020



Source: ITU

Context: **Renewable energy, automation and AI benefit contribution efforts**

Fortunately, the tech-electronics sector has capitalised on its own resources to invest in solutions that actively contribute to climate change mitigation. The automation of manufacturing lines has been ongoing for decades, and new technologies - such as computer-aided design, demand and supply tracking software, robot assembly lines, virtual and augmented reality and digital twin solutions – have enabled companies to improve efficiency and more accurately target investments to achieve the least impact from operations. The CCIF tracker found that many of the companies surveyed were already actively investing in asset modernisation with the accompanying benefit of improving their ESG profiles.

A key area of focus for the sector is improving the sourcing and consumption of energy, with advances in technologies generating energy from renewable sources often cited in companies' climate change contribution strategies. The move is not surprising, given that the energy-dependent manufacturing sector has been seeking ways to become more self-sufficient since the energy crises of the early 1970s. The light manufacturing tier of the sector – which includes electronics production – has always had a more modest energy usage footprint than heavy manufacturing; nevertheless, as a more consumer-facing segment, it has had to move faster to adapt. The CCIF tracker shows that better-capitalised and internationally-facing companies have had more of an incentive to improve than smaller companies active on a localised scale.

While better usage and interpretation of energy usage data has enabled companies to find more efficient operating models, the key driver is now the transition to sustainable energy sources. Over the last five years, many private and listed companies have been seeking renewable power suppliers or engaging in offsetting measures to improve their contribution profiles. However, the main impediment to progress has been the under-developed nature of the renewable power supply market.

In the summer of 2023, Taiwan Semiconductor Manufacturing Corp (TSMC) – the world's leading semiconductor manufacturer in terms of volume – opined that Taiwan, China's slowness in developing renewable energy supplies was weighing on its efforts to improve its impact.[15] TSMC noted that electricity usage accounted for 62% of its carbon emissions in 2022. Around the same time, Samsung Electronics noted that Korea's under-developed renewable energy ecosystem was proving to be a challenge in its efforts to contribute to climate change mitigation. Samsung's semiconductors unit, SK Hynix, reported that only 4% of its power supplies came from renewable sources in 2022.[16] These admissions could see major clients of these companies turn elsewhere for non-critical needs to address their own Scope 2/3 reduction goals.

Key semiconductor-makers' renewable energy roadmaps

Company	Current use of renewables	Target For 100% renewable usage
TSMC (Taiwan, China)	10.4% of total, 100% for overseas operations in 2022	2050
Samsung (Korea)	20.5% of total, 100% for US, Europe, China operations in 2022	2050
Intel (Global)	93% of total in 2022	2030
SK Hynix (Korea)	4% of total in 2022	2050
Kioxia (Japan)	0.02% of total in YE March 2022	2040
Infineon (Germany)	100% in Europe and US in 2022; smaller but undisclosed level for Asian operations	2030

Source: Company filings, Financial Times

Resources such as water are often used in the production process, most notably for cooling or cleansing purposes,and among other things, companies must consider the burden they are placing on local water supplies and their contamination. Companies must also consider how they can mitigate risks relating to water supply shortages under changing climatic conditions – notably, drought and shorter but more intense rainy seasons are becoming more problematic across APAC, meaning that the timely capturing and cleaning of deposited water supplies must be planned for with as much intensity as developing solutions to scale water usage in order to reflect changing local supply conditions.

Contribution to the transition

Asset modernisation is a key element of tech-electronics companies' efforts to decarbonise. Companies must replace ageing, power-inefficient plants with low-energy systems. Automation – which can range from simple digital quality control systems to sophisticated robotic assembly systems – is helping to accelerate production with fewer faults or wastage of raw materials. Offices and plants are also being decarbonised, with clear efforts being made to switch to renewable energy and energy-efficient lighting and heating systems. Changes to distribution systems are also being pursued, with lighter and more ergonomic recyclable packaging as well as the introduction of electric-powered vehicles. In this regard, companies that have significantly increased their capital expenditures and research and development budgets to address their contribution efforts score well in this category.

Opportunities

The tech-electronics sector is dominated by many well-capitalised and technologically proficient companies that are playing a key role in the industry's low carbon transition. A significant proportion of those that do not already do so will likely begin to contribute over the next 10-15 years, but many small private and state-owned enterprises will struggle to make a meaningful contribution.

The critical area of weakness lies in the lack of comprehensive and standardised data collection, reporting, analysis and responses. This will become a particularly pressing issue as their international partners across the value chain look to improve their own sustainability goals and pivot towards entities that can demonstrate decarbonisation.

Where some companies are yet to report certain data, their overall scores are lower than they should be; it may be the case that in areas where no data points are available, they may be performing better than their peers. On the flip side, it may be the case that the reporting of some companies is over-stated reflected in artificially higher scores. The key takeaway is that the lack of standardised data makes it hard to evaluate each company on its respective achievements with respect to decarbonisation.

Healthcare index

Using the CCIF, the healthcare index aims to capture the extent to which operations, investments, and strategies of companies operating in this sector align with the Paris Agreement goals of mitigation, adaptation, contribution to the transition, plus financial capability.

Mitigation

Over the past five years, the healthcare sector has intensified efforts to mitigate climate change. This has primarily been achieved by reducing GHG emissions in the production of medical products (including pharmaceuticals and medical devices) and in delivering medical services, particularly within hospitals. The healthcare sector is also increasingly tracking and reducing energy consumption in manufacturing and general operations, specifically in its usage of electricity and natural gas. In terms of the industry's approach to sustainability, healthcare prioritises the reduction of medical waste (some of which is hazardous), energy efficiency policies and water management, which is particularly important in the manufacture of pharmaceuticals.

Adaptation

Despite water being an important raw material in the manufacture of pharmaceuticals, healthcare companies are seeking to measure and reduce total water usage in production processes and general operations. This is particularly important in water-stressed regions, such as the Middle East and North Africa. Many newly built hospitals in middle and high-income markets collect rainwater, treat wastewater onsite and employ water-saving technologies. The healthcare sector does not rely on many physical raw materials, so is not overly concerned about reducing reliance on inputs that are sourced from vulnerable ecosystems. Healthcare is one of the most globalised sectors, so it is paying closer attention to climate hazard risks, such as droughts, floods, and other natural disasters. While the provision of medical services is generally decentralised, enabling patients to access some form of healthcare in challenging circumstances induced by climate change may not always be the case in more rural areas.

Contribution to the transition

In terms of contribution to the transition, healthcare is gradually increasing investments in renewable energy sources, such as solar power and biomass generators, for manufacturing plants, hospitals and clinics. This trend is especially noticeable in newly constructed facilities and is highlighted in corporate reports. Healthcare produces large quantities of waste, especially plastic and packaging. As such, the industry is becoming more involved in activities that encourage the appropriate disposal and recycling of used products. A particular concern for the healthcare sector is the safe disposal of clinical waste, which is either incinerated or sent to landfill for decontamination. Waste management capabilities within healthcare are well-developed, mainly due to public safety concerns and stringent regulations covering disposed medical items.

Opportunities

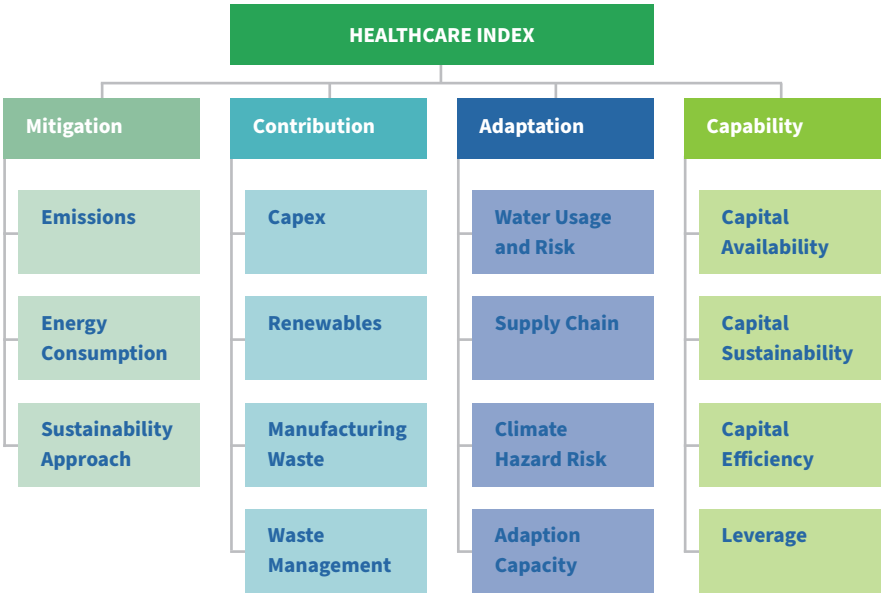
The healthcare sector, has in recent years recognised its unique position in both contributing to and addressing environmental sustainability. While the industry was initially slow in aligning with the Paris Agreement's goals, it has made substantial strides in mitigating its impact through reducing emissions, waste management, and incorporating renewable energy. The sector's shift from CSR to a core focus on ESG criteria exemplifies a greater commitment to responsible practices.

Despite setbacks such as increased plastic usage and higher emissions during the Covid-19 pandemic, the industry's embrace of telemedicine and efforts towards pandemic preparedness demonstrate adaptability and resilience. With the realisation of its substantial climate footprint, the industry is accelerating towards net-zero targets, and should progress with addressing scope 2 and 3 emissions. The commitment to LEED standards and alignment with UN's SDGs shows a refined approach to sustainability.

Moreover, the healthcare's sector current tracker score and the identified data gaps in its index present both a challenge and an opportunity. The relatively low score and higher-than-average data gaps signal room for substantial improvement in transparency, reporting and alignment with climate goals. By investing in robust data collection, analytics and comprehensive reporting mechanisms, the industry can address these gaps and provide a more accurate representation of its sustainability efforts. Enhanced transparency and adherence to internationally recognised standards will not only improve the sector's tracker score but foster trust among investors, regulators, and the public. This focus on data integrity and transparent reporting is a critical step in the healthcare sector's journey towards achieving its sustainability objectives and reinforcing its commitment to environmental issues.

The healthcare sector has evolved from being a minor concern in the climate debate to becoming a leading participant in the global climate effort. The sector's complex interplay in both health and climate, along with its economic importance, underscores the vital role it will play in shaping a future that aligns human wellbeing with ecological balance. The journey to net zero by 2050 represents not just a goal, but an imperative for a sector that has the expertise and resources to be a leader in the global transition to a more sustainable future.

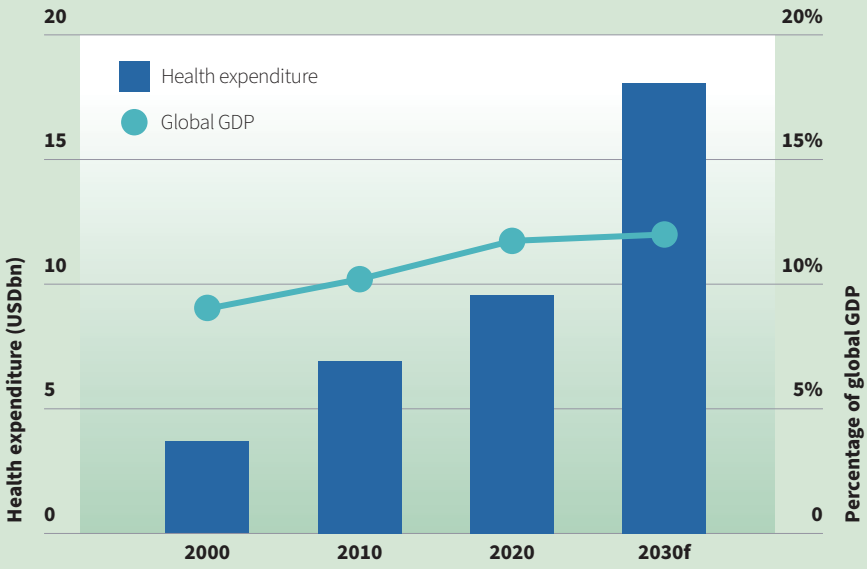
Healthcare index composition



Context: **Formerly a Minor Concern**

Compared with other sectors, healthcare has been less concerned with environmental matters in general, and climate change in particular. This is because medical services and products like pharmaceuticals are generally non-discretionary, high-value and beneficial to human health. Any environmental costs incurred in giving care to patients or the manufacture and distribution of medicines are significantly offset by the healthcare sector's wider benefit to society, specifically reducing the burden of disease. These attributes and circumstances are reflected in healthcare having the lowest average sector tracker score (43.5) out of the eight industries that were evaluatedin the previous iteration of this report.[17] This situation is reinforced by healthcare having the third highest amount of data gaps in its index (an average of 3.6 gaps), which is above the average (1.6 gaps) and just behind basic industries (3.0 gaps) and autos (3.3 gaps).

Figure 2.4: Global health expenditure (USDbn) and percentage of global GDP



f = BMI forecast. Source: World Health Organization (WHO), BMI

From CSR To sustainability

In the late 1990s and early 2000s, multinational pharmaceutical and medical device companies started to express their commitment to external stakeholders in the immediate and wider community as corporate social responsibility (CSR). Activities under the term CSR included ethical commercial practices, employee support programmes, environmental initiatives, charitable contributions, social activities and operational safety plans. Within environmental initiatives, the focus was the prevention of pollution and protection of ecosystems. Multinational pharmaceutical and medical device companies began to openly express concerns about global warming and climate change around 2010, with such concerns becoming widespread by 2015.

The 2015 Paris Agreement's worldwide importance and dedication to environmental sustainability have brought the concept of ESG criteria to the forefront. As a result, multinational pharmaceutical and medical device companies now commonly use the term ESG instead of CSR. Most of the larger firms produce an annual ESG report, which outlines their efforts to improve emissions, energy usage, waste management, employee diversity, medicine access, product safety, board composition and ethical business practices. These documents are intended for investors, employees, stakeholders and other interested parties.

The concept of ESG, which is often used interchangeably with the term sustainability, is now a core component of the corporate strategies employed by companies in healthcare. As a result of global health expenditure accounting for a higher percentage of global GDP between 2000 and 2030, healthcare is increasingly seen as an attractive investment opportunity. Expansion of the sector also means that healthcare systems are progressively influenced by major external forces, such as industry and macroeconomic megatrends, geopolitical and trade tensions, digital transformation, and the low carbon energy transition.

Covid-19 setbacks

The outbreak of the Covid-19 pandemic led to global travel restrictions and economic slowdowns. As a result, air pollution and GHG emissions dropped within a matter of weeks. However, within the healthcare sector, energy usage and emissions both increased in 2020-21. To provide care for the influx of severe Covid-19 patients, healthcare systems created dedicated wards in hospitals, doctors and nurses worked longer hours, demand for medical devices such as ventilators rose sharply, and the mass testing of suspected infections was rolled out. This phenomenon was mainly seen in developed markets, which were already the primary sources of healthcare emissions globally.

Usage of plastic in healthcare also rose dramatically during the pandemic when the extensive use of plastic-based personal protection equipment (PPE) became standard practice. In the wider community, surgical face masks were mandated. These masks predominately comprised polypropylene-fabrics, along with metal nose wires and occasionally rubber bands to keep the mask in place. As the pandemic progressed, health systems purchased and distributed billions of diagnostic kits, which were also mainly plastic-based. In the last stage of the pandemic, the rollout of vaccines added to the immense volume of plastic consumed, specifically in the form of vaccine syringe barrels, plungers and needle hubs.

During the pandemic, the use of telemedicine surged as restrictions on personal movement forced healthcare systems to adopt technologies like video calls. This allowed patients to consult with doctors remotely, reducing the need for physical visits to clinics and hospitals. Consequently, there was a decrease in GHG emissions associated with travel to healthcare facilities. Although the use of telemedicine has declined since the pandemic ended, it remains substantially higher than pre-2020 levels. As the healthcare sector moves towards achieving net zero emissions over the coming decades, telemedicine will play a significant role.

A key feature of the post-Covid-19 healthcare landscape is increased public spending on pandemic preparedness. Governments realise that the provision of medical services was severely strained during the pandemic, and policy changes need to be made before the next major global infectious disease outbreak. Investments are being made in disease surveillance, response planning, stockpiling of essential medical supplies and the creation of emergency funds. If these measures are successfully developed and implemented, the impact of the next pandemic on emissions will be less than what was seen during Covid-19.

Acceleration towards net zero

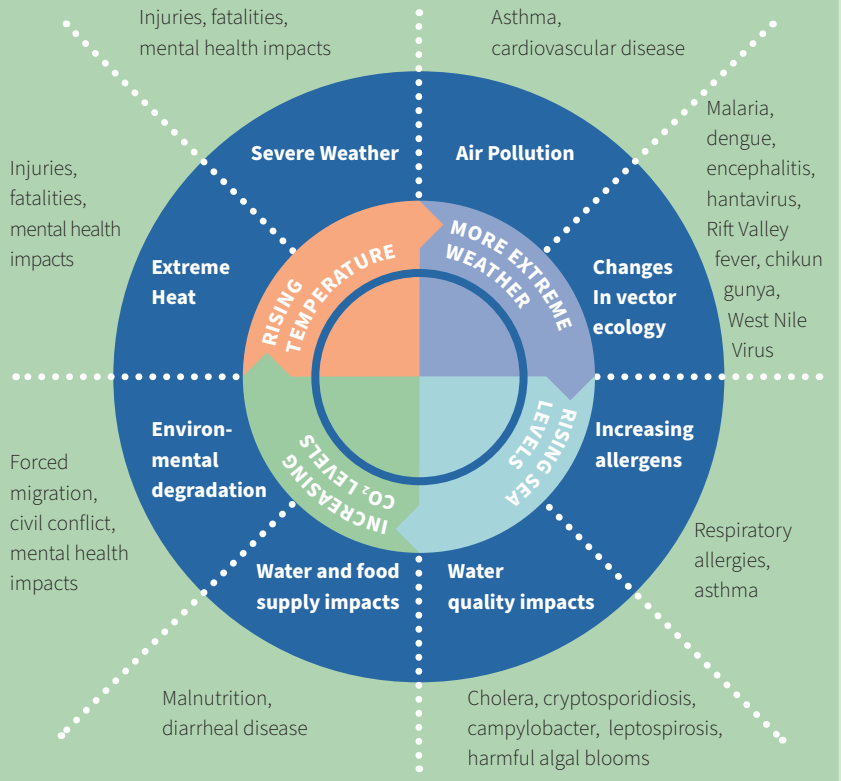
The healthcare sector will accelerate efforts to achieve net zero targets. Most of the large publicly listed companies in the sector are now tracking and disclosing GHG emissions, energy consumption, manufacturing waste and water usage. Many of these firms have the principal goal of achieving net zero by 2050. Due to the intensifying climate change discourse seen in recent years, the healthcare sector is likely to bring forward transition objectives, representing opportunities and challenges for the sector and its stakeholders, including governments, investors and the public. Another fundamental shift for the sector is broadening emission reduction efforts to include Scope 2 and 3. Healthcare's climate footprint is equivalent to nearly 5% of global net emissions (equivalent to 2 gigatons of carbon dioxide). Emissions emanating directly from hospitals/clinics and Healthcare vehicles (Scope 1) make up 17% of the sector's global footprint. According to the non-profit organisation Health Care Without Harm, if healthcare were a country it would be the fifth-largest emitter on the planet.[18]

A few developed markets have introduced regulatory instruments that are encouraging the healthcare sector to transition. The Biden-Harris Administration in the US has initiated the Health Sector Climate Pledge, which aims to reduce GHG emissions in the Healthcare industry by 50% by 2030.[19] This pledge has been signed by 61 of the largest US hospital and health sector companies, representing over 650 hospitals. The initiative also includes plans for climate resilience and public health protection. Meanwhile, NHS England aims to be net-zero by 2045, and this has been embedded in UK legislation since 2022.[20]

Healthcare has the unique capability to contribute to climate resilience by developing treatments for climate-related diseases. The coming decades will see increasing carbon dioxide levels, rising atmospheric temperatures, more extreme weather and rising sea levels. This will result in a higher prevalence of a range of medical conditions, such as malaria, dengue fever, asthma, cholera, cardiovascular failure and mental health impacts. Consequently, there will be an increased demand for pharmaceutical and medical device companies to develop and commercialise vaccines, diagnostics and therapies specifically targeting climate change-related health issues. This represents new business opportunities for companies arising from the need to help people adapt to climate change impacts.

A refinement in healthcare's approach to sustainability will be an important feature of the transition to net zero. All new healthcare facilities in developed states will soon adhere to the Leadership in Energy and Environmental Design (LEED) standard or similar accreditation. Healthcare companies will increasingly align with the UN's Sustainable Development Goals (SDGs) and the GRI. Plastic usage in healthcare will be minimised through systematic application of the waste management framework of the 3Rs (reduce, reuse and recycle). Additional resources will be directed to addressing sustainability issues associated with radioactive healthcare waste, anaesthetic-generated emissions and hospital wastewater-facilitated antimicrobial resistance.

Figure 2.5: Impact of climate change on human health



Source: Centers for Disease Control and Prevention (CDC)

Basic industries sector tracker

In the context of this report, basic industries means building and construction, and environmental services Using the CCIF, the basic industries index aims to capture the extent to which operations, investments, and strategies of companies operating in this sector align with the Paris Agreement goals of mitigation, adaptation, contribution to the transition, plus financial capability.

Mitigation

The mitigation pillar comprises six segments, the first of which is based on a company's GHG emissions intensity and growth. Here, the index assesses each company's percentage change in emissions between 2016 and 2020 and gives a ranked score relative to the other companies in the index. This score is combined with a carbon intensity score, which measures the total emissions per unit of total sales for the company.

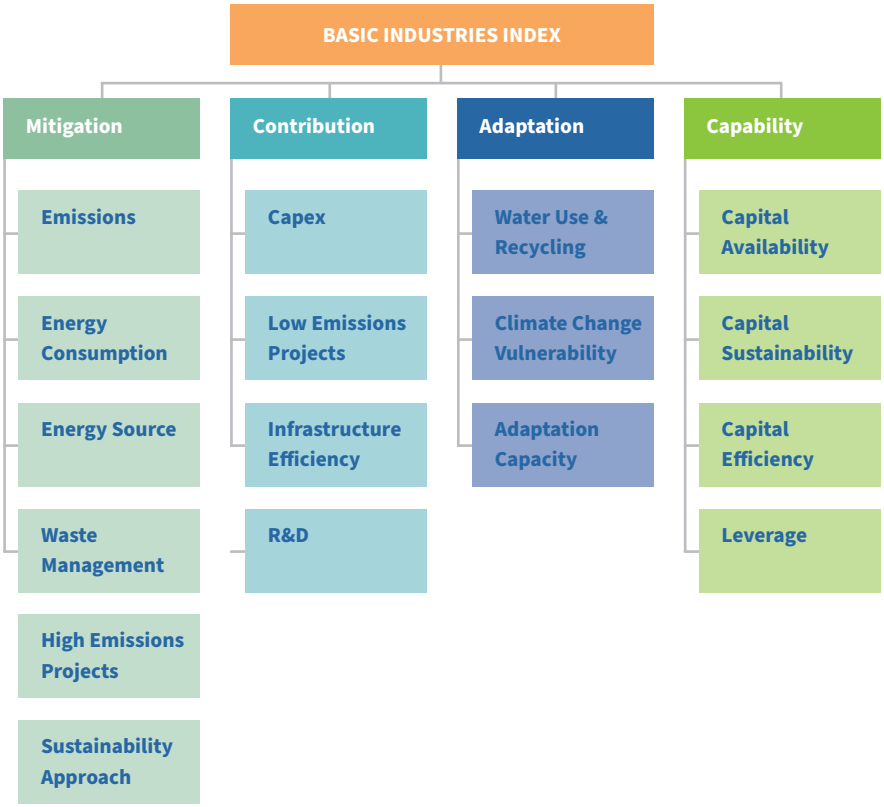
The energy consumption segment assesses each company's total energy consumption in thousand kilowatt hours (KWh) and then ranks each company's total energy consumption per unit of total sales to calculate a score. Meanwhile, the fuel mix segment considers what types of fuels are used by the company, including use of coal, oil/diesel, natural gas, and renewables.

Waste management is a weighted average of two scores relating to waste and waste recycling. More weight is given to the score for recycling, a qualitative assessment of the extent to which each company recycles waste. Where available the score considers data on waste recycled by a company, as a share of total waste. The score related to waste in turn assesses the total waste of a company and then generates a score based on the total waste per unit of sales compared to other companies.

The High Emissions Projects measure is driven by an assessment of the relative share of each company's project pipeline value in USD terms accounted for by high-emission projects, in order to gauge the impact of the projects on GHG emissions.. This is calculated using Fitch Solutions' proprietary Infrastructure Key Projects Data.

The final segment, sustainability approach, is qualitative. By researching and analysing each company's annual reports, sustainability reports, websites and other official documentation, the Index assesses a company's commitment to supporting mitigation efforts. Scoring considered aspects such as the presence of dedicated committees, budgetary allocations, internal policy formation, disclosure practices, mitigation commitments and plans in place to achieve these targets, as well as the existence of policies around aspects such as energy efficiency, waste reduction, water use and climate change.

Basic industries index



Adaptation

Adaptation is divided into three segments, the first of which assesses a company's water management practices. This is made up of a score assessing a company's total water use per unit of total company sales compared to other companies, which is then combined with a qualitative score assessing the extent of company efforts to recycle water. This qualitative score is informed where available by company data on water recycling as a share of total water use. Climate change vulnerability is a function of the company's exposure to climate change risks based on its operating location. The last of these three segments, adaptation capacity, refers specifically to the response capacity and preparedness of each company to adapt to climate change. This considers both the company's geographic location and strategy.

Contribution to the transition

Contribution is divided into four segments, beginning with capex which measures the overall investment undertaken by the company over the most recent reporting year. The low emissions projects score combines a qualitative score of a company's efforts to pursue low emissions and resilient projects with a quantitative measure of the number and value of low emission projects within a company's project pipeline. This is also calculated using Fitch Solutions' Infrastructure Key Projects Data.[21]

The infrastructure efficiency segment is a qualitative measure of the extent to which companies are pursuing energy efficiency in structures and whether t a company has adopted a green building policy.

Finally, the R&D segment considers a company's contribution towards innovation and improvement in the industry. This is done by combining a quantitative measure of R&D as a share of company revenue with a score derived from qualitative analysis using company annual reports and other official documentation to consider each company's efforts in adopting green technologies.

Context: **Modest shifts but momentum is growing**

Due to the high emissions from the basic industries sector, its decarbonisation is integral to global climate change mitigation, including efforts to meet GHG reduction commitments set out under the 2015 Paris Climate Change Agreement. For example, construction and buildings overall, including the production of cement and other materials as well as the operational emissions of buildings constructed with those materials, accounted for 37% of global GHG emissions in 2021, according to the UN Environmental Programme.[22] Despite this, the basic industries sector has seen relatively modest progress toward emissions reduction. While 2020 saw a reduction in emissions across industries, amid the Covid-19 pandemic, emissions rose again in 2021 as economic activity rebounded. Global construction industry value, grew globally by 3.8% y-o-y in 2021 in real terms, bringing global construction activity above its pre-pandemic peak of 2019. Further growth of 0.9% y-o-y was recorded in 2022, as demand for construction services and materials continued to expand.

Inconsistent levels of regulatory focus on the sector across geographies has been one factor leading to relatively slow progress. At the company level as well, this limited progress is mirrored by relatively low attention to climate change mitigation and adaptation by companies in the sector. For example, companies within the sector generally trail those of most other sectors in terms of the reporting of climate-related data such as figures related to energy consumption, waste management, and GHG emissions.

The use of the Global Real Estate Sustainability Benchmark (GRESB) and equivalent frameworks to benchmark the sustainability of real assets, at present, tends to be conducted predominantly by financial institutions to measure the ESG compliance and performance of brownfield assets. Whereas GRESB is more widely applied to real estate investments, efforts by institutional investors to promote sustainability reporting among infrastructure assets are gathering momentum. Among such efforts are the Paris Aligned Asset Owners, Net Zero Asset Managers Initiative, and the Institutional Investors Group on Climate Change (IIGCC). In particular, the IIGCC provides guidance for infrastructure assets; this is a complement to its Net Zero Investment Framework that details best practices for sustainability reporting by infrastructure assets.

Though the integration of ESG factors, particularly 'E' issues, during the design and construction phase is growing, currently these are not systematically adopted across all segments of real assets. Green building certification programs in developed markets, such as Leadership in Energy and Environmental Design (LEED) in the US and Building Research Establishment Environmental Assessment Method (BREEAM) in the UK, are longstanding examples of sustainability considerations. Again, however, this highlights the relatively more-developed nature of sustainability reporting among real estate versus infrastructure assets.

While overall progress remains modest, there are notable shifts underway within the sector which, though still at a nascent stage, point to a growing focus on the part of both governments and firms on emissions reduction. Among these shifts, explored in more detail below, is a rising focus on emissions from the production of materials, with notable cases of governments beginning to ramp up regulation in this area and companies boosting relevant actions and investments. Also among these shifts is a growing focus on the emissions of the assets that materials are used to build, such as buildings and infrastructure.

Growing focus on materials emissions

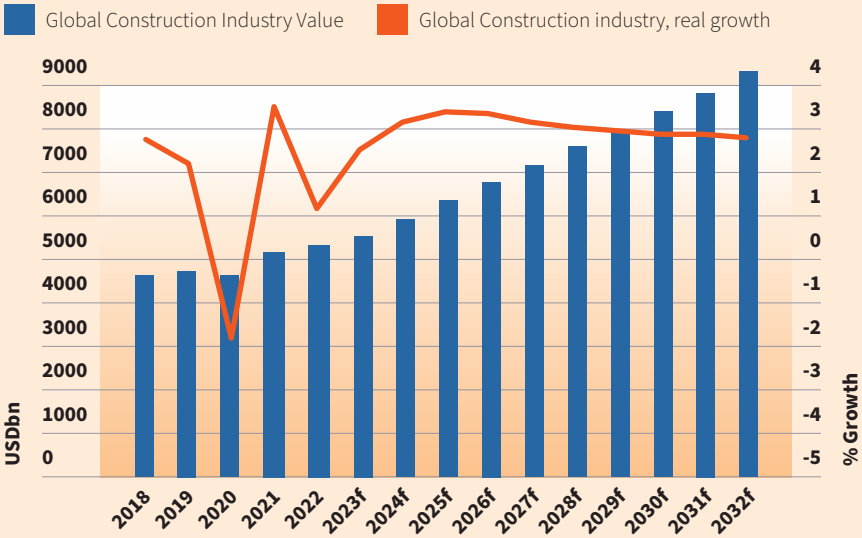
While still limited at a global level, recent years have seen an uptick in regulations and policies aimed at reducing emissions from the materials industry which are increasingly shifting the landscape for companies in this area. The EU has been a leader in this regard, with carbon pricing through the European Emissions Trading System (EU ETS), and permit prices have risen considerably since 2020. Carbon pricing through the ETS has incentivised companies in the EU to adopt emissions-reduction strategies, including for example the adoption of more energy-efficient kilns and the development of new lower emission forms of concrete. Looking ahead, the tightening of rules under the ETS over the coming years because of reforms adopted in April 2023 stands to boost the cost of emitting carbon further for materials providers, further incentivising emissions reduction.[23]

Additionally, the adoption of the first carbon border adjustment mechanism (CBAM) globally by the EU from 2024 stands to place pressure on exporters of key materials such as cement, steel, iron and aluminium located outside the EU as the implementation of the CBAM ramps up in the coming years. With other markets such as the UK and Australia also contemplating the adoption of CBAMs, there is further potential for pressure on suppliers particularly in developing markets.

Alongside increased regulation, a greater focus on the emissions of assets in operation such as buildings and infrastructure by clients of the construction industry is increasing pressure for emissions reduction during the development of assets. This, along with construction companies' own emissions reduction targets, is increasingly serving as a hard incentive for construction companies to adopt lower-emission construction materials and methods, most notably in developed markets.

Amid these shifts in both the regulatory landscape and client preferences, construction materials providers are increasingly incentivised to find emissions reductions in the materials production process. This can include more energy efficient systems, such as more efficient kilns in the case of cement producers, or the development of new products such as more energy efficient concrete. Other likely areas of investment and greater proliferation include steel produced from low-emission

Figure 2.6: Global Construction Industry Value, 2018-32



Source: BMI; f = BMI forecasts

electric arc furnaces, timber and potentially the adoption of carbon-capture technology, which currently forms a central pillar of many materials companies' strategies to reduce emissions. Waste management is also increasingly an area of attention, as is energy procurement, with the use of a greater share of renewable energy to power production processes an appealing option for many companies to reduce emissions.

Along with change and innovation around the production of construction materials, a greater focus on materials emissions is also spurring innovation in the construction process as construction companies look to adopt practices and technologies to reduce use of materials and project emissions. This includes a growing focus on nascent construction methods, such as offsite construction and 3D printing which can lead to less waste generation relative to onsite construction. Further, a more controlled and efficient construction process will reduce emissions involved in the production of materials and buildings, as well as across the building's lifetime by ensuring a more energy-efficient output.

Other adjustments to reduce emissions in the construction process are being pursued, that avoid the wholesale shift that offsite construction tends to require. This includes Building Information Modelling (BIM), drone technology for site monitoring, and the use of robotics for site automation which each provide greater visibility of onsite emissions, enhancing the understanding of the required construction inputs and thus minimising site waste. [24] This greater visibility of onsite emissions and on how to minimise site waste would directly enable a construction site operator to reduce, in particular, its scope 2 and 3 emissions. For example, the elimination of unnecessary or excessive onsite work, if such work is energy-intensive, would reduce its scope 2 emissions by eliminating emissions entailed in its purchase of energy. Waste generated in operations, meanwhile, is explicitly accounted for under scope 3 emissions; minimising site waste would directly translate into lower scope 3 emissions. Naturally, understanding the nature of a construction site's direct emissions, scope 1 emissions, would help identify the emissions over which the site operator has direct control to reduce.

The use of BIM can improve cost efficiency in the design and construction process, as well as streamline its activities, reducing a project's environmental impact. In addition, artificial intelligence (AI) has been integrated into BIM technology and transformed the way buildings are designed. The technology will also help with the mitigation of risk and the planning of projects, whilst also offering significant efficiency gains via the real-time analysis of data.

Shifting investment trends

There has been an increasing shift in the type of projects that are being adopted and demanded, amid a greater consideration of the emissions and resilience of buildings and infrastructure assets. In the building sector, this trend is centred around a growing emphasis on energy efficiency. According to the IEA, the operations of buildings account for 30% of global final energy consumption and 26% of global final energy-related emissions.[25] Though still limited at a global scale, governments are establishing regulations aimed at reducing building energy use. This includes regulations affecting both new and existing buildings and implemented across various government levels including at subnational, national, and supranational levels, with the EU's REPowerEU a prominent example of a recent policy initiative which places emphasis on building energy efficiency.[26] This regulatory push, together with shifting consumer preferences, is driving demand for more efficient building systems, spurring the installation of existing systems and incentivising the development of new technologies, benefitting companies which are first movers in this area.

The infrastructure sector is seeing a shift towards those projects which support climate change mitigation and adaptation. This includes the power sector where there has been a proliferation of renewable energy generation projects as governments, utilities and corporates look to renewables development as a decarbonisation lever. This shift, which has seen global renewables capacity overall grow by over 350% between 2012 and 2022, is increasing demand for companies specialised in the production and installation of renewables systems, such as solar panels and wind turbines. It is also boosting investment in transmission and battery storage systems, in turn increasing opportunities in these areas, given the need to integrate new renewables projects into transmission grids and the benefits of battery storage systems amid growth in intermittent renewable energy capacity.

Though climate mitigation investment continues to account for the preponderance of sustainability-related funding, climate adaptation investment remains an impactful segment of funding. This is particularly so in markets already experiencing climate change-related events and incidents of extreme weather. Flood prevention, water desalination and water resource management works are becoming increasingly essential in order to protect major cities and other large urban areas from the growing threat of climate change.

Building regulation is already requiring the increased use of efficient management of energy, water, waste and other resources. This is often supported by the integration of smart technology into building design, including the use of smart sensors to facilitate resource consumption patterns and optimise the performance of existing infrastructure.

In the transport sector, a push away from ICE vehicles is the development of EV enabling infrastructure such as charging stations. Mass transit including both electrified intercity and metro rail systems are also experiencing increased investment. While these shifts are driving new opportunities, they also generate risks for companies whose business model remains dependent on higher-emissions projects. For example, a growing global effort to move away from coal in electricity generation is impacting demand for services and inputs related to projects such as new coal plants. Moving ahead, such risks appear likely to expand, as these trends accelerate further.

Opportunities

The progress of the basic industries sector in terms of the climate transition has been modest, with much still to be done to reduce emissions in line with the goals of the Paris Agreement. Companies which can accelerate this process will be better placed amid a growing policy focus in this area and will be less exposed to changes in regulation and customer preferences where they favour lower emissions projects, products, and materials.

Anticipating regulatory changes will be critical for companies in the industry, including changes in terms of carbon pricing schemes as well as rules and regulations related to the implementation of CBAMs. Understanding shifts in technology will also be central, as technological innovation will be key to opening new opportunities for emissions reduction in areas such as material production and offsite and onsite construction.

Companies which anticipate a rising demand for certain types of construction services and the materials and inputs needed to buildout the projects will stand to benefit considerably, as investment in those project types expands. Technological change and the emissions of projects over the lifecycle will be particularly critical for companies to understand and consider in this process. On the other hand, companies which fail to anticipate shifts in project development trends risk seeing a reduction in market share, as opportunities are reduced.

Company level analysis

Climate Bonds examined how the latest set of common widely accepted disclosures could be used to rank companies according to CCIF dimensions and identify areas of engagement for investors. The analysis concludes with a deep dive into one company per sector and how issuers of labelled bonds align along the CCIF.

Overview

Climate Bonds derived a list of disclosures that a company should submit to present a transparent climate transition plan.[27] For each of these disclosures, Climate Bonds assigned a score of one if the information was provided. These disclosures were then weighted to capture the degree of ambition or progress in the company's transition journey (see Appendix 1), as guided by Climate Bonds five principles for financing a credible transition.[28] The resulting score can be seen as a first step to categorise the maturity of corporate plans in integrating the Paris Agreement objectives.

Selection of companies

Companies headquartered in AIIB member countries were randomly selected for each sector by BMI. Most were in Asia and include representation from developed and emerging countries whose 2022 annual revenues range from USD0.5bn to more than USD80bn.

Climate Bonds added a further 19 issuers of labelled bonds for its own study to investigate the extent to which labelled bond issuance indicates a strong climate strategy integration.

Companies analysed operating in the auto sector were mostly auto manufacturers and several electrical battery producers. Those operating in basic industries are either real estate or infrastructure companies. Healthcare companies are a mix of pharmaceuticals production, healthcare providers and healthcare equipment manufacturers. Finally, tech-electronics companies are design manufacturers or original equipment manufacturers.

Figure 3.1: Basic industries companies, China' headquarters

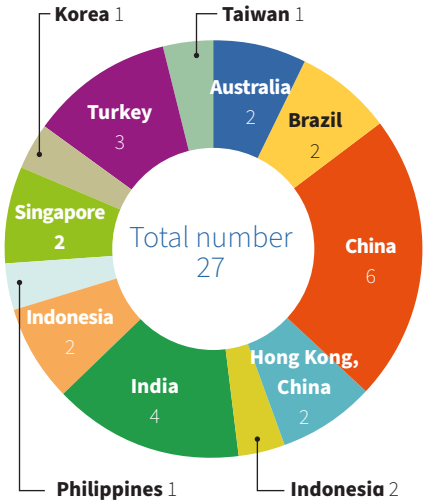


Figure 3.2: Autos companies' headquarters

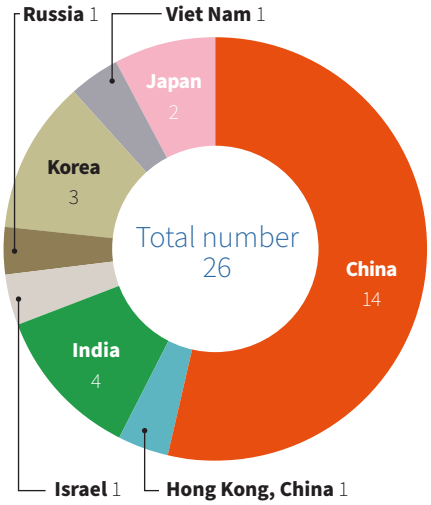


Figure 3.3: Healthcare companies' headquarters

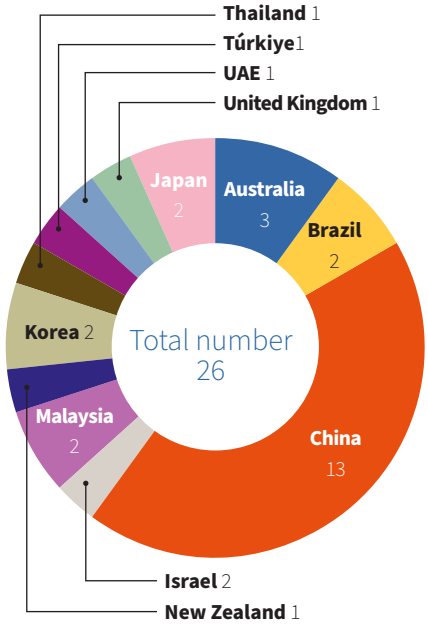
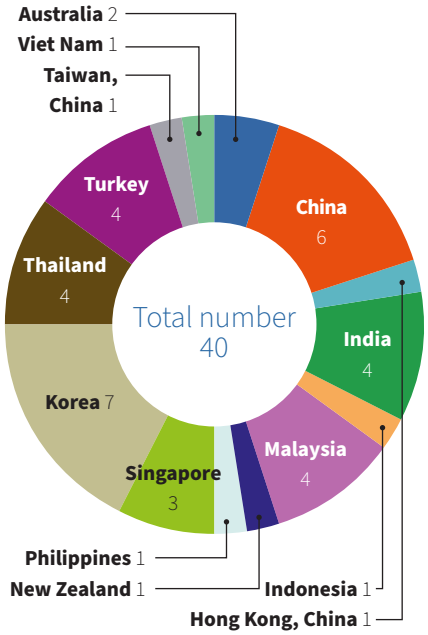


Figure 3.4: Technology-electronics companies' headquarters



Source: Climate Bonds

Climate Bonds Five Transition Principles[29]

1. In line with 1.5 degree trajectory
All goals and pathways need to align with zero carbon by 2050 and nearly halving emissions by 2030.

2. Established by science
All goals and pathways must be led by scientific experts and be harmonised across countries.

3. Offsets don't count
Credible transition goals and pathways don't count offsets, but should count upstream scope 3 emissions.

4. Technological viability trumps economic competitiveness Pathways must include an assessment of current and expected technologies. Where a viable technology exists, even if relatively expensive, it should be used to determine the decarbonisation pathway for that economic activity.

5. Action not pledges
A credible transition is backed by operating metrics rather than a commitment/ pledge to follow a transition pathway at some point in the future. In other words, this is NOT a transition to a transition.

Auto companies

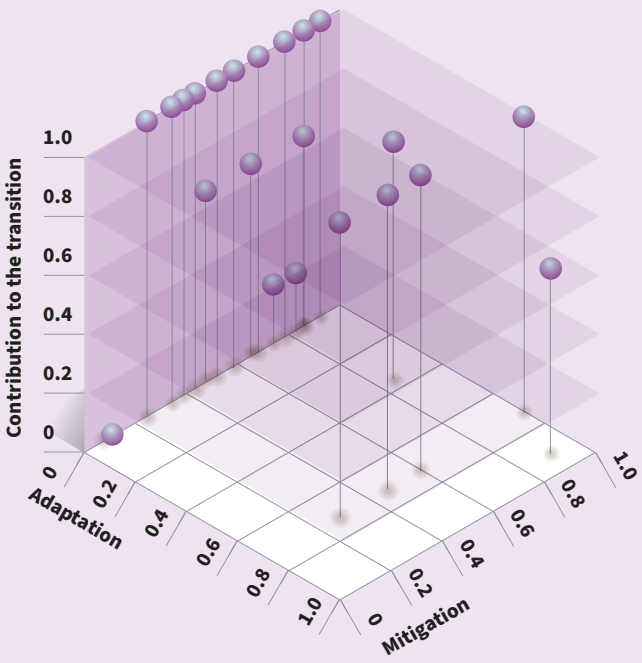
Autos is actively transitioning:

- All 26 companies except one are including EV/batteries in their product offering and board oversight of the transition is standard for most. Despite venturing into EV production, most manufacturers' product offerings remain ICE-dominant, particularly in Asian and developing markets.
- The auto sector has a major role to play to accelerate the decarbonisation of the supply chain and three quarters do have a green procurement policy, yet no concrete engagement to procure green steel had been announced among the sample studied.

Strong variation in the maturity of mitigation plans:

- Most had long-term 2050 carbon neutrality goals for these emissions scopes.
- A third of the 26 firms had short- and mid-term scope 1 and 2 targets, an indication that planning for the transition has been initiated.
- Only six are sufficiently advanced in their transition journey to announce scope 3 targets for the short, medium, and long term.

Figure 3.5: Climate Bonds ranking of autos companies



Source: Climate Bonds

- Half of the issuers have announced decarbonisation levers tackling their operational GHG emissions, such as engagement with suppliers, vehicle carbon intensity reduction, greener factories, logistics, and materials.

Tech-electronics companies

Climate change doesn't influence the strategic orientation of the 40 tech-electronics companies but sustainability matters:

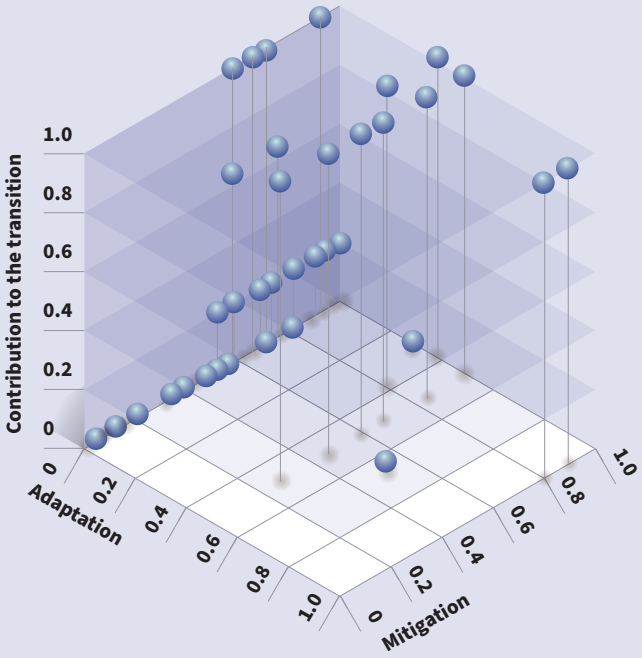
- Half of the sample has identified the opportunities generated by climate change and made changes to the product offering.
- Half of the companies have announced a green procurement policy but there is no indication yet that their effort is having a material impact on the supply chain.

Strong variation in the maturity of the mitigation plans:

Scope 2 and 3 are the most material for this sector and:

- Only half of the companies have long-term decarbonisation targets but another four have mid-term commitment only.
- A quarter of the companies have scope 2 short-term targets, with the other quarter only committing tor a medium-term target.
- Only two companies have scope 3 short-, medium- and long-term targets. Six more companies aimed to reduce scope 3 emissions in the long term.

Figure 3.6: Climate Bonds ranking of technology and electronics companies



Source: Climate Bonds

Healthcare companies

Climate change isn't a priority of the 30 companies analysed but sustainability matters

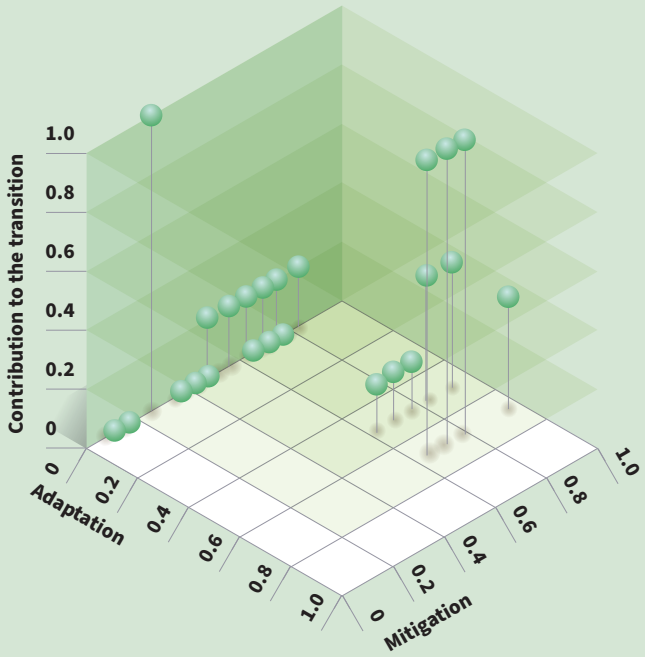
The main potential contribution that the healthcare sector can make to the transition is through its supply chain engagement, particularly with the chemical sector. Climate Bonds analysis demonstrated that a majority (19) of the companies have already green procurement in place.

Strong variation in the maturity of mitigation plans:

Scope 3 is the most material for this sector:

- Only half of the companies have long-term decarbonisation targets but five companies have announced plans for the medium-term only.
- 12 companies have scope 1 and 2 targets for the short and medium -term.
- Only two companies have scope 3 short-, medium- and long-term targets. Two more companies aimed to reduce Scope 3 emissions in the medium-term.
- The primary sources of scope 3 emissions in the healthcare sector are 'Purchased Goods and Services' that dominates at 48% and this should be the focus of the sector.[30] This is acknowledged by 19 companies, but these are largely at the beginning of their engagement process.

Figure 3.7: Climate Bonds ranking of healthcare companies



Source: Climate Bonds

Basic industries companies

Climate change is being integrated into the strategy of the majority of the 27 companies analysed:

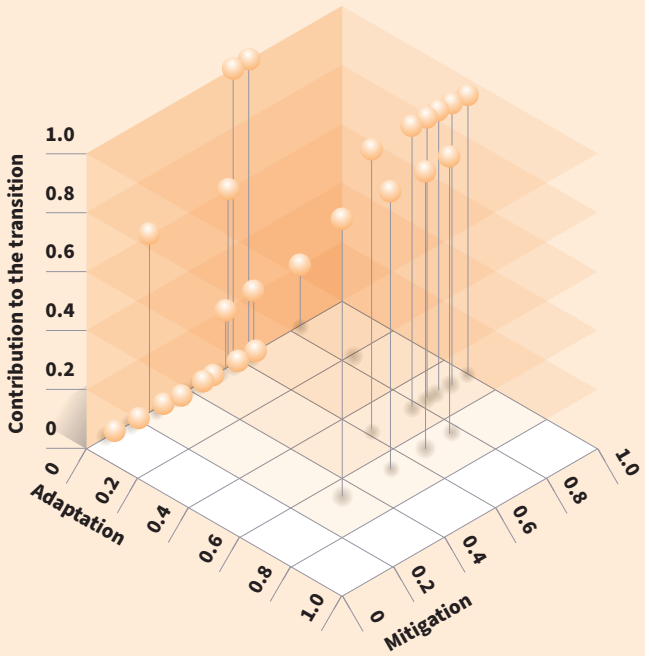
Most companies have identified the opportunities the climate transition presented their business and incorporated it into their product range (green building certifications etc.) The contribution to the transition extends to other sustainability needs like building water conservation projects, seawalls, and desalination plants.

But climate mitigation efforts varied a lot

The most material sources of emissions are scopes 1 and 2:

- Half of the companies don't have any scope 1 and 2 decarbonisation targets.
- 10 companies have medium-term scope 1 and 2 decarbonisation targets
- Scope 3 emission targets areeven rarer: two have short-term, three have medium-term, and six have long term targets. One promising observation is that just over half of issuers in the sample had also set green supply chain policies to tackle scope 3. This suggests that companies without scope 3 targets are nonetheless working on reducing scope 3 and this could lead in the future to decarbonisation commitments.

Figure 3.7: Climate Bonds ranking of basic industry companies



Source: Climate Bonds

When targets are set, a material proportion of companies do not yet align these with a decarbonisation pathway. For those companies that are more advanced, the main pathway followed is in line with NDC. SBTi verifications remain a minority.

Offsets are used and not necessarily for the last mile of carbon emissions. Offsets should not be used as a reason for not decarbonising or delaying the transition.

Adaptation plans remain the least advanced objective of the CCIF in each sector and planning is not observed more in high-risk countries.

Decarbonisation plans

PATHWAY	n.a.	NDC aligned	None	Other verification	SBTI committed	SBTI Verified
Autos (26 companies)	2	10	5	2	3	4
Basic Industries (27 companies)	12	4	4	1	2	4
Healthcare (30 companies)	4	7	8		7	4
Tech-electronics (40 companies)	11	5	13	1	5	5

Adaptation plans

Physical risk level	Proportion w/o adaptation plans	Proportion with adaptation plans
High-risk (22 companies)	14	8
Medium-risk (63 companies)	48	15
Low-risk (38 companies)	16	22

Offset used

	Yes
Autos (26 companies)	9
Basic Industries (27 companies)	7
Healthcare (30 companies)	8
Tech-electronics (40 companies)	19

Healthcare case study: Samsung Biologics

Samsung Biologics (Samsung) is the largest Contract Development and Manufacturing Organisation (CDMO) in the world, a service provider offering seamless development and manufacturing solutions from cell line development to final aseptic fill/finish as well as laboratory testing services at every stage for biopharmaceutical products. 2022 revenues were KRW3tn (USD2.4bn). It is majority owned by two industrial affiliates of Samsung group: Samsung Electronics and Samsung C&T. The company is located in Songdo, Incheon, Korea. The company's 2022 GHG emissions totalled a bit less than 1 million tCO_2e, of which approximately 80% were Scope 3.[31]

Samsung's vision is to maintain its leadership positioning by driving quantitative growth; it completed its fourth biomanufacturing facility in 2023 and announced plans to build a fifth one. The company regards the incorporation of ESG considerations as central to maintain its competitiveness.

Mitigation

As the company is rapidly expanding its production facilities, its decarbonisation targets are expressed as a percent reduction with respect to a projected baseline that includes the expected level of emissions of the company once its fifth production facility is operational. The company has committed to reduce its scope 1 and 2 emissions by 32%, and its scope 3 by 36% by 2030 compared to this projected baseline, which falls short of a 1.5°C decarbonisation pathway and is therefore not in line with Climate Bonds first hallmark of a credible transition. Climate Bonds recommends disclosing targets in absolute GHG emission instead to reinforce the credibility of the commitment. A 2040 target is also announced. The company hasn't benchmarked its pathway and is considering SBTi certification.

Strong governance and disclosure and the existence of scope 1 and 2 decarbonisation plans that are supported by the company engagement to RE100 initiative (a global corporate initiative aiming at getting influential businesses to commit to 100% renewable electricity and reaching this target by 2050) confirm that the company's climate strategy is fully embedded in the overall company strategy.[32] Climate Bonds estimates however that integrating for instance an internal carbon price into the strategic decision process would send a strong signal that decisions about future business expansion are factoring in the necessity to reduce absolute GHG emission.

The main challenge facing Samsung lies in decarbonising its supply chain and Climate Bonds applauds the approach followed so far: 1) a strong commitment, via its participation with other global pharma companies to the sustainable market initiative, setting joint scalable action to accelerate the decarbonisation of the sector; 2) a thorough assessment of the carbon footprint of each product via building an inventory of its key suppliers and setting up a roadmap to perform a Life Cycle assessment for each of its product; 3) definition and implementation of its supply chain green purchasing policy and sustainable supply chain policy. 4) communication on its climate goals and engagement with the suppliers to play their part in the decarbonisation effort. The next key step will be to define and implement targets of decarbonisation for its suppliers that would be inclusive and fair.

Adaptation

Samsung s ran the analysis following the TCFD guidance and use various scenarios to estimate its risks. The company has identified flood risk and heat waves as physical risks, estimated the financial impact, and detailed its current response measures. The coastal location of the company makes the flood risk particularly acute, and any investment decisions should investigate further the adequacy of the measures taken by the company.

Contribution to the transition

Samsung's main contribution to the transition is by positioning itself as a leader to decarbonise and influencing upstream supply chain, and particularly the chemical industry, to decarbonise.

Auto sector case study: Toyota Motor Corporation

Toyota Motor Corporation (Toyota) is a multinational auto manufacturer headquartered in Japan. Among the most prominent auto manufacturers globally, it recorded sales revenue of JPY31.3tn (USD280bn) in 2022. In the same year, its total vehicle sales volumes of 8,230,425 vehicles remained majority (73%) ICE, and just over a quarter (27%) from EV. In 2022, Toyota's CO_2 emissions totalled 575 million tCO_2, of which approximately 99% were scope 3.[33]

Toyota's vision is to become a producer of carbon neutral vehicles that would be fuelled by various technologies, depending on the specificity of each region. Toyota's climate strategy is based on the assessment that to avoid carbon emission and to reduce them as quickly as possible, it is important to factor in the capacity of each country to switch to renewables electricity sources and each country's strategy; Toyota has therefore opted to maintain its hybrids range, arguing that its low cost makes it an effective way of reducing CO_2, to develop hydrogen or biofuel-based vehicles to adapt to local specificities (Japan, South America) and to prepare a full lineup of electrified vehicles, offering 30 new vehicles by 2030. Unlike several industry peers, Toyota has not committed to stop producing ICE vehicles.

Mitigation

Toyota has set a strong decarbonisation path with medium-term targets certified by SBTi as aligned to a 1.5°C decarbonisation pathway for scope 1 and 2 and a below 2°C pathway for the scope 3 emission intensity (CO_2e per km) of all vehicles. Climate Bonds notes as well that the targets are not reliant on offsetting emissions, in line with its principles for a credible transition. Strong governance, disclosure and thorough decarbonisation plans, that have already started and encompass all vehicle types and production facilities, confirm that the company's climate strategy is fully embedded in the overall company strategy. Scope 1 and 2 emissions decreased over the past few years. However, a transition financing plan is needed to fully appreciate the ambition and credibility of these proposals together with a quantification on how each of the outlined decarbonisation levers will enable the company to achieve its goals.

As scope 3 is the bulk of Toyota's emission, the overall medium term SBTi certified decarbonisation target falls short of Climate Bonds transition principle to be 1.5°C aligned and the absence of commitment to stop producing fossil-fuel based vehicles signals that Toyota's transition doesn't align with Climate Bonds transition principle that technological viability trumps economic competitiveness. Scope 3 emissions increased over the past few years. Toyota's mitigation strategy could have an impact on its ability to mitigate the transition risks that might arise from a tightening of regulations for fuel efficiency and zero-emission vehicles and the establishment of carbon pricing mechanisms worldwide. Most of Toyota's products and much of their existing production line could become stranded assets due to their low fully electric vehicles (battery EV, BEV) product share.

Adaptation

The company's adaptation strategy to an increased risk of natural disasters is well-noted: business continuity plans are continuously adapted, including disaster support agreements with local governments and a multi-faceted system to mitigate disaster risk on employees, supply chains, buildings, and equipment. This is encouraging considering the relatively low climate-risk exposure of Toyota's main markets, including Japan and North America.

The company doesn't mention the procurement of raw materials as a potential limitation to its strategic orientation.

Contribution to the transition

The company rightly identified heightened EV demand as a significant opportunity arising from climate change. Climate Bonds applauds its response to this through its quickly expanding range of hybrid EVs (HEVs), plugin HEVs, BEVs, and Fuel Cell EVs (hydrogen based).

In addition, through its approach of tackling decarbonisation at each step of the vehicle life cycle, Toyota is a main driver of the transition of the whole supply chain. So far, this has not extended to an announcement of a green procurement policy. While hydrogen fuel- based vehicles have the potential to be carbon neutral, their deployment in Japan relies first on developing nationwide carbon neutral production facilities that won't be ready for 2030, as per Climate Bonds recent analysis of the latest Japan policies.[34] Biofuel vehicles present the additional risk of having an indirect impact on deforestation and food security, as highlighted by Climate Bonds taxonomy criteria for biofuel.[35] Toyota recognises the challenge but its initiatives to tackle them are still limited in scope and degree of advancement. Finally, Inevitable Policy Response (IPR) recently forecasted that an efficient deployment of biofuel would imply increasing production in arid and cold biomes instead of tropical locations and bioenergy used for road transport would be outcompeted by lower carbon alternatives and be efficient only for shipping, aviation and pulp and paper. TheIPR assessment conflicts with the company's vision of developing biofuel-based vehicles in Brazil.[36]

Technology-electronics case study: HCL Technologies

HCL Technologies (HCL) is a multinational information technology service and consulting company headquartered in Noida, India. The company operates in 60 countries with a total revenue of USD12.6bn in the 2022 financial year. HCL's GHG emissions were recorded at approximatively 450 MCO_2e, of which scope 2 emissions account for a third, and scope 3 emissions to a bit less than two thirds.[37]

HCL's current product offering is technology and data-dependent, and thus is inherently aligned with a 1.5°C future. The company is committed to long term value creation for all its stakeholders, incorporating the right ESG practices to ensure a sustainable present and future.

Mitigation

Strong governance and disclosure, and the existence of decarbonisation plans for the three scopes of emissions confirm that the company's climate strategy is embedded in the overall company strategy. The company has already started its decarbonisation journey and has reduced scope 1 and 2 emissions by 30% in the past two years.

Scope 1, 2, and 3 decarbonisation targets are ambitious and have been validated as 1.5°C aligned by SBTi.

Procurement of renewable energy and measures to reduce energy use are the two decarbonisation levers envisioned by the company to further reduce emissions. The shift to renewable energy will be through a mix of onsite production and renewable energy procurement, however there is no information on the level of commitment to produce as much as possible onsite. Best practice would be for HCL to invest in its own renewable electricity production to be more resilient.

Scope 3 emissions have been increasing over the past few years. To reduce scope 3, the company announced electrification of its vehicles, reducing work-from-home emissions through education and awareness, adopting a life cycle approach to reducing the carbon footprint of its purchased goods, reducing business travel and incentivising decarbonisation through the value chain but the level of disclosure remains limited on that last lever.

The company doesn't disclose a transition finance plan but took the excellent initiative to use an internal carbon pricing tool to integrate the carbon impact in its investment decision making process.

The company has started projects which can generate nature-based carbon offsets and plans to use them to cover its residual emissions. Climate Bonds advises entities to follow the guidance of the Voluntary Carbon Markets Integrity Initiative to set up and use these offsets.[38]

Climate Bonds considers that the absence of detailed scope 2 and 3 emission reduction plan, linking each source of emissions to a detailed decarbonisation lever, and the absence of a finance transition plan prevent the current analysis to conclude on the strength of HCL's transition plan.

Adaptation

HCL's analysis of risks and opportunities is ongoing. The company has completed the assessment for its operations in India and the United States and identified numerous physical risks, notably heatwaves, saltwater intrusion, and coastal flooding. Adaptation levers are identified and being implemented. .

Contribution to the transition

The company develops climate related solutions for its clients and quote several examples of those:

- A comprehensive framework and a set of solutions addressing sustainability through the entire product lifecycle namely product design, product manufacturing and end of life;
- A system for net zero operation, that enables clients to monitor, assess, and reduce enterprise energy consumption and carbon emissions through its unique ability to analyse multiple types of equipment, processes, and facilities at once;
- An integrated ESG platform to help financial institutions accelerate execution of sustainable finance strategy.

Further engagement would be needed to try to quantify the contribution of the transition of these climate solutions.

As was highlighted in BMI sectoral analysis, E-waste is a material source of waste of tech-electronics companies, including HCL, however no specific measure has been announced to reduce it. The company is active in reducing another environmental footprint, its water consumption, through a series of measures that are being detailed.[39]

Climate Bonds recommends that further efforts should be made to engage both the upstream and downstream supply chain to try to reduce the environmental footprint and support its transition.

Basic industry case study: Hyundai Engineering and Construction

Hyundai Engineering and Construction Company (HyundaiE&C) is the eleventh largest construction company in the world by sales and recorded KRW21.2tn (USD16.0bn) of revenues in 2022. In 2021, it recorded GHG Emissions of 9.58m tCO_2e, of which 96.9% were from scope 3.[40] The company was selected for analysis as it was among the top performers in the sector in terms of disclosure.

Hyundai E&C has a detailed and comprehensive transition narrative for its future asset base and how it plans to achieve zero-emissions. These plans cover their existing segments of buildings, civil engineering, and power generation. They also aim to grow a hydrogen business, and to expand their offering of automation in manufacturing and construction segments.

Mitigation

Hyundai E&C has identified the potential risks and opportunities climate change presents to its business and has included these in its projected product offering. Its climate strategy is strongly integrated within the company's strategy and governance and the company is best in class in terms of disclosing its climate transition and ESG metrics.

Hyundai E&C has short-, medium-, and long-term targets for its decarbonisation, spanning all three scopes of its emissions. Its 2030 targets to reduce scope 1 & 2 emissions (46.2%), and scope 3 emissions (25%) against a 2020 baseline have been validated by SBTi, as being aligned with 1.5°C and well below 2°C respectively. The company aims to achieve net zero status by 2045, using offsets and carbon capture technologies to account for the last 10% of its residual emissions.

Hyundai E&C has action plans for all scopes of emissions, and across its business segments: for its buildings segment it plans to utilise energy efficient designs and systems, renewable energy use, and green building certifications; for its construction segment is plans to utilise smart construction technologies, prefabrication, green or low-carbon materials usage, amongst others; for its power segment it plans to utilise renewable energy infrastructure, hydrogen production and transportation infrastructure, and CCUS development. Complementing this, it plans to focus its R&D expenditure on green projects and technologies that cover its existing business segments.

Climate Bonds considers that the recent plan announced by the company is strong but should be further strengthened with a transition financing plan and short-term actions; this would ensure the transition plan were aligned with Climate Bonds fifth principle of a credible transition that highlights the importance of actions and not pledges. Climate Bonds would also enquire why the company cannot commit to deforestation free activities before 2050.

Adaptation

Hyundai E&C has identified its physical risks based on various potential climate change scenarios and has identified a five-year plan to prepare, including but not limited to heatwave preparedness training, water and rainwater recycling facilities, flood response infrastructure, and an internet-of-things flood response system. It is currently still working on establishing further emergency response systems and modelling potential infrastructure damage or loss in the event of natural disasters.

Contribution to the transition

Hyundai E&C recognises the pivotal role it can play in contributing to the transition using its product range, and tracks and reports its green revenues, against the EU Taxonomy (it also reports revenues against the Korean K-Taxonomy). In 2022, it reported 52.1% of its total revenues coming from such green products, up 6% from the previous year, and plans to increase this to 60% by 2030.

The company is also driving the transition in the value chain by developing innovative low carbon building materials and signing a memorandum of understanding for joint development and technological cooperation of low-carbon construction materials with Holcim, a global leader in environmentally friendly construction materials.

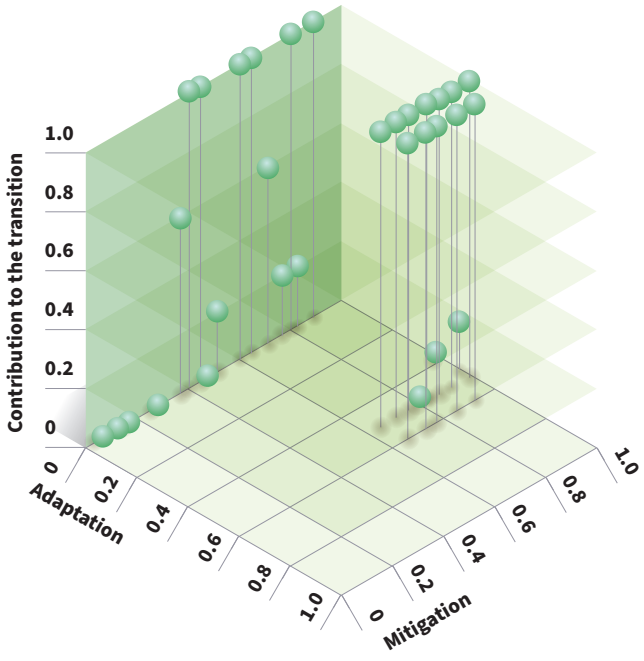
Labelled bond issuers' integration of Paris Agreement objectives

Just under a third of the companies reviewed were issuers of green, sustainable or sustainability-linked debt. Labelled debt can be used to finance the transition of companies and therefore be an instrument of choice to deploy climate related investment strategies.

As issuing labeled debt is a way to improve the sustainability profile of a company, one legitimate question is to understand to what extent issuers of labeled debt integrate the three objectives of the Paris Agreement into their strategy.

The activity of issuing a labelled bond subjects the company to stronger scrutiny from investors on its environmental credentials; therefore issuers of labelled bonds should logically be in alignment with Paris Agreement objectives,

Figure 3.8: Climate Bonds ranking of labelled issuers



Source: Climate Bonds

especially in sectors materially impacted by the transition. In addition, the International Capital Markets Association (ICMA), whose guidelines on labelled bonds are widely followed internationally, recommends that issuers of labelled debt should explain their climate strategy plan.[41]

However, labelled debt can be used to finance sustainable or social projects that are not directly connected to decarbonising activities and if they are, they do not imply that the company is committed to the climate transition. Therefore, we could also encounter issuers performing poorly along the CCIF.

Climate Bonds looked at the results of the survey on the subset of companies that had issued labelled debt: 15 companies in the tech-electronics sector, 12 in the auto sector, five in the healthcare sector,and four in basic industries. The difference in number is due to the lower number of labelled bond issuers in the healthcare and basic industry sectors. Tech-electronics and autos have traditionally been more active as many of their business activities are considered as eligible under green financing standards.

The result clearly highlights a group of companies aligning strongly with the three objectives and all sectors are represented. We do observe however companies performing poorly along all objectives and the associated bonds are not related to the climate transition (the sustainability bonds with Use of Proceeds (UoP) earmarked for COVID-19 related projects, one to develop electric buses issued by the only autos company that didn't plan to shift its product offering to renewable fuels and the last one from a tech-electronics company with very low level of disclosure).[42]

When looking more specifically at the bonds issued by the auto sector, they are all labelled green except one that bears the sustainability label. UoP was earmarked mainly to developing the EV offering or batteries, so would be a natural investors' choice to increase exposure to climate change solutions. The sustainability bond was a recent issuance by Nissan, a perfect example of a UoP bond capturing the climate transition of the whole company along several CCIF objectives; Climate Bonds expects such deals to be more frequent: the eligible projects cover a wide range of objectives, from activities contributing to the transition (R&D in zero-emission vehicles, batteries, charging infrastructure), to the mitigation effort (scope 1 and 2 emission reduction via producing or purchasing renewable energy, energy efficiency measures), to reduce other environmental impact (sustainable water management, waste management), and contribute to society (autonomous driving which can ensure a safer and cleaner mobility according to Nissan, use of battery as energy storage system to cover power shortages).

Among the tech-electronics sector, some bonds were dedicated to the mitigation effort as the UoP was earmarked for decarbonisation levers or the sustainability-linked bond Key Performance Indicators (KPI) were focused on reducing GHG emissions. A few bonds had UoP earmarked for developing new climate aligned activities or a mix of mitigation activities and activities with a social component like helping to get access to information technologies.

Appendix 1

Appendix: BMI Low-Carbon Energy Transition Framework

The low-carbon energy transition framework compares the progress of 18 markets in the APAC region in terms of their energy transition momentum. The assessment revolves around the three pillars of the CCIF: climate mitigation, adaptation, and contribution to the transition. Mitigation is highlighted by the level of clean technology deployment lowering emissions, adaptation is shown by technologies that reduce the vulnerability of markets and contribution is demonstrated by the extent to which policy and regulation is supporting each market to bring about energy transition.

Climate mitigation

Mitigation efforts focus on reducing emissions through fossil fuel phase-out and technology developments to address scope 1, 2, and 3 emissions. Key indicators under this pillar are:

- **High emission power generation share**: Highlights the need to reduce high-emission power generation sources, such as coal and fossil fuel-based plants, to combat climate change.
- **Electric vehicle adoption rate**: Encouraging the adoption of electric vehicles (EV) is a vital mitigation strategy aimed at reducing the carbon footprint of the transportation sector.
- **Low carbon hydrogen production outlook**: Low-carbon hydrogen can play a substantial role in mitigating climate change by providing a cleaner alternative for various industries including some types of transportation.

Climate adaptation

This pillar includes forecasts for renewable growth in the context of reconfiguring each market's power mix to increase resiliency through the diversification and accelerated adoption of clean technology.. Key observations include:

- **Low carbon power capacity**: Developing and deploying low-carbon power sources is crucial for adaptation, helping to increase reliability and resiliency through clean technology, as well as providing clean energy for energy-intensive adaptation needs.
- **Electricity import dependence**: Countries may need to adapt their energy infrastructure to reduce dependence on electricity imports, ensuring a more resilient and self-sufficient power system.
- **Energy storage capacity outlook**: Energy storage contributes to adaptation, enabling the integration of variable renewable energy sources, enhancing grid stability, and coping with climate-induced disruptions.

Contribution to energy transition

Encouraging the adoption of emission-reduction technologies requires an active and growing contribution from market policies and regulators. Key topics are:

- **Renewable share of total power mix:** This indicator examines the growth, output and share of renewable energy sources in each market's total power mix, showcasing progress towards a more sustainable energy landscape.
- **Economic performance, public expenditure & GDP growth rate**: A strong economy and public spending can support investments in clean energy and sustainable infrastructure, thus contributing to the energy transition.
- **Energy policies**: Energy policies play an important role in driving the energy transition by providing the framework for promoting renewable energy, energy efficiency, and sustainability in the power sector.

By structuring the assessment around these pillars, the framework offers a comprehensive evaluation of climate-related factors and their impact on all markets that are examined within the BMI Low-Carbon Energy Transition Framework.

The Rewards categories are overweighted at 60% with Risks weighted at 40%. The matrix assigns a lower weight to the Risks framework to account for the higher risk appetite of institutions meaning that Industry and Country Risks are given lower priority. Within the Rewards framework, Industry Rewards is assigned the highest weighting (40%, compared to Country Rewards on 20%). This reflects the fact that when it comes to long-term investment potential, industry size and growth potential carry the most weight in indicating opportunities, with other structural factors (demographics, labour statistics and infrastructure availability) contributing to a lesser extent. The focus on emerging and frontier markets also dictates this bias towards industry size and growth to ensure that opportunities are identified in markets where regulatory frameworks are less developed and industry sizes are smaller (in US dollar terms) compared to developed markets, but where there is a strong desire to invest.

Appendix 2

Climate Bonds Scoring Methodology

Climate Bonds developed a simplistic scoring system to assess each company against the pillars of the CCIF: mitigation, adaptation, and contribution to the transition pillars:

1. Mitigation
An assessment of the company's transition plan, covering the metrics listed in the Scoring Framework below.

2. Adaptation
An assessment of the company's vulnerability to physical and climate risks, based on the metrics listed in Scoring Framework below.

3. Contribution to the transition
An assessment of the company's recognition of climate change related opportunities and following this their inclusion of such opportunities in their product range, as defined in Scoring Framework below.

Further definitions of the respective indicators and data points are available in the List of further definitions below the Scoring Framework.

Scoring Framework

MITIGATION FRAMEWORK			
Indicator	**Indicator categories (where applicable)**	**Number of points: Y**	**Notes**
GHG accounting methodology stated		1	The scoring for each of the targets was weighted differently based on the materiality of each scope to the sector. For the tech-electronics sector, scope 1 and 2 targets received 1.2 points each, and scope 3 targets received 0.6. While for the auto, healthcare, and basic industry sectors, this was 0.8 points and 1.4 points respectively.
Scope 1 short term (<2025)		1.2 / 0.8	
Scope 1 med term (<2030)			
Scope 1 long term (<2050)			
Scope 2 short term (<2025)			
Scope 2 med term (<2030)			
Scope 2 long term (<2050)			
Scope 3 short term (<2025)		0.6 / 1.4	
Scope 3 med term (<2030)			
Scope 3 long term (<2050)			
Non-emission environmental factors			
	Measured, targeted	4	Relevant factors included metrics such as water usage, recycling rates, general energy consumption, amongst others.
	Measured, not targeted	3	
	Not measured	2	
	n.a.	1	
Target verification			
	SBTi verified	2	
	SBTi committed	1	
	NDC aligned	0.5	
	Other verification	0.5	
	None	0	
Materiality matrix		3	
Decarbonisation lever maturity			
	Sector-specific detailed, all material emissions	5	Full list of sector-specific definitions available in List of further definitions
	Sector-specific levers outlined	3	
	General levers detailed	2	
	Levers in development	1	
	None	0	
Offset use		(N=2, Y=0)	
Green supply chain policies		3	
Independent GHG verification		2	

Scoring Framework

MITIGATION FRAMEWORK Continued			
Indicator	**Indicator categories (where applicable)**	**Number of points: Y**	**Notes**
Disclosure framework			
	CDP	3	
	TCFD	1	Having TCFD or GRI or SASB gives maximum 1 point
	GRI		
	SASB		
	Other	(1)	Point awarded for use of a national disclosure framework, only if no other disclosure frameworks used.
	None	0	
ADAPTATION FRAMEWORK			
Climate adaptation/resilience plan in place		Rather than generate scores based on these data points, Climate Bonds evaluated the distribution of companies with adaptation/resilience plans in place vs. their country of headquarters' ND-GAIN Index score.	
Notre Dame GAIN Index score			
CONTRIBUTION TO THE TRANSITION FRAMEWORK			
Climate change opportunities identified		2	
Opportunities included in the product offering		5	

List of further definitions

Regarding decarbonisation lever maturities:	
Categorisation	**Definitions**
Sector-specific detailed, all material emissions	General and sector-specific decarbonisation levers detailed, covers all material scopes of emissions. Well detailed and cohesive to strategy.
Sector-specific levers outlined	General and sector-specific decarbonisation levers implemented, covers Scope 1 & 2 scopes of emission. Not necessarily very quantitatively detailed.
General levers detailed	Non-sector specific ways of decarbonisation (eg. Renewable Energy, EV fleets, office energy efficency adjustments, energy saving) detailed. Likely covers Scope 1 & 2, but not really Scope 3.
Levers in development	Description of decarbonisation levers focuses on exploration of potential changes or particular instances of decarbonisation (e.g. at a particular plant or site), rather than entity-level changes. Likely does not cover all material scopes of emissions.

Regarding Sector specific decarbonisation levers vs. general		
Sector	**General lever examples**	**Sector-specific lever examples**
Autos	Energy efficiency, use of renewables in manufacturing.	Pivot towards EVs and/or battery manufacturing. Green Steel, steel/aluminium recycling, and low carbon material procurement. Battery recycling, green logistics, etc
Pharma	Energy efficiency, use of renewables in ops.	Engagement with chemical suppliers.
Tech	Energy efficiency, use of renewables in ops.	Green product offering, energy efficiency in offices, renewables
Construction	Energy saving materials and equipment	Green materials, renewable powered building construction, pivot towards green buildings

Endnotes

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Suggested citation: AIIB et al (2024), Companies and Climate Change,
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