

Ready or not?

Sector Performance in a Zero-Carbon World

MOODY'S



Foreword from Rob Fauber, President and Chief Executive Officer of Moody's Corporation



Few issues are poised to multiply risk – or opportunity – more dramatically in capital markets than climate change. The economic benefit from the transition to a climate resilient, zero-carbon economy could amount to nearly a 25% cumulative gain in GDP over the next two decades alone compared with a scenario in which the world fails to act. This is equivalent to adding the current Italian or Canadian economy to the global economy each year over this period, and creates a \$45 trillion investment opportunity¹ for those able to take advantage of it.

As a global integrated risk assessment firm, Moody's helps organizations understand how climate issues will shape future performance in capital markets. This report assesses the outlook in a scenario of rapid emissions reduction for carbon-intensive sectors – the ones whose transformation will be vital to the world's ability to halve emissions by 2030 and achieve a net zero economy by 2050. Incorporating insights from across Moody's, it analyzes these sectors' exposure to climate risk and their relative 'transition readiness', and models the likely impacts on their default risk.

Looking at the data, it is clear that carbon transition will be a key factor in corporate competitiveness. What emerges is a picture of mixed momentum and preparedness within and between sectors in the race to zero. While confirming the well understood risks that face sectors like oil and gas, the report also highlights important differences among other industries. For example, in the past two years and against the backdrop of a pandemic, auto manufacturing and utilities have made rapid progress from being among the most exposed to being better positioned for the net zero economy.

There is significant and growing demand in the financial system for accurate assessment of climate risk and opportunity. Through this line of research – along with the data and analytics we are developing across Moody's – we hope to provide the tools and insights needed to support sustainable and resilient investments that enable sectors and companies to thrive in a zero-carbon future.

¹ Calculation by Moody's Analytics economists, based on data, scenarios, and assumptions from the Network for Greening the Financial System

Executive Summary

The shift to a net zero global economy is well underway and accelerating. As critical carbon-intensive sectors undergo rapid transformation, there are significant and diverging impacts on transition preparedness, with implications for default risk and industrial competitiveness. The ability of these sectors to navigate risks and unlock opportunities over the next 10 to 15 years in this fundamental realignment of the global economy will determine whether a 1.5°C world is in reach by 2050.

In this report, we analyzed carbon-intensive sectors including utilities, automotive, airlines, cement, shipping, and oil and gas, which will be central to global efforts to decarbonize the economy². Together they account for nearly 85%³ of global emissions and represent some of the hardest sectors to abate. There are five headline findings:

² Calculation by Moody's Analytics economists, based on data, scenarios, and assumptions from the Network for Greening the Financial System

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⁴ Moody's Investors Service findings.

⁵ Moody's Investors Service findings.

⁶ Moody's ESG Solutions findings.

1 Progress

Momentum in automotive and utilities demonstrates that rapid improvement in companies' positioning for a rapid transition is possible in some of the most carbon-intensive sectors.

- » The automotive sector has shown particularly significant improvement over the past two years in its preparedness for a rapid carbon transition scenario due to a combination of higher forecasts for alternative fuel vehicle production and improved prospects for complying with emissions regulations. As a result, 80% of the companies we scored are better positioned for rapid transition than in 2019. While there is much to be done and execution risk remains high, this finding highlights that government policy, market pressure, and corporate innovation can combine to create momentum for rapid change.
- » Issuers in the utilities sector have also displayed higher levels of preparedness overall than the other sectors we analyzed⁴.

2 Challenges

Many carbon-intensive sectors and companies are less well-positioned for a rapid transition – leaving the world off track for 1.5°C.

- » Of the 335 issuers that we have scored to date, which included many of the largest companies in their sectors, 157 are not well-positioned for a rapid transition scenario and face significant financial climate-related transition risks as a result. The oil and gas sector as a whole is the least prepared, and the airline industry faces significant challenges⁵.
- » Taken together, we estimate that today's stated emissions reduction plans from companies across all economic sectors are aligned with a global temperature increase of at least +2.6°C by 2100⁶.

3 Risk

Variations in disclosure within and between sectors mask hidden climate-related financial risks. In some key instances company-level disclosures do not fully reflect the true level of exposure.

- » The automotive and utilities sectors perform well on target setting and transition assessment scores. Transport and Logistics is the most improved sector overall on climate-related disclosure, increasing its reporting rate to 27% in 2021 from 14% in 2020⁷.
- » Yet only 13% of companies across the economy disclose analysis that provides an understanding of how possible climate scenarios could impact their business. Such disclosure is a crucial part of accurately assessing companies' ability to manage climate-related threats and to capture economic opportunities presented by the transition⁸.

⁷ Moody's ESG Solutions findings.

⁸ Moody's ESG Solutions findings.

⁹ Moody's Analytics findings.

¹⁰ Moody's Analytics findings.

4 Pressure

Sectors that are least prepared overall for rapid transition also have the widest range of potential default risk outcomes for individual companies. Competitiveness is set to intensify within sectors as some companies position themselves to prosper in a zero-carbon future.

- » The top 10% best prepared companies in any sector may reduce their overall default risk and strengthen their financial performance over a five-year timeframe in an 'Early Action' scenario in which decarbonization ramps up this decade.
- » Reflecting an upside for first movers, some of the best-performing firms from important yet currently worst-performing sectors end up with lower default risk than the worst-performing companies in sectors that are perceived as overall leaders⁹.

5 Opportunity

Early action by companies during the 2020s can halve their probability of default compared to delayed action, while enabling the global economy to chart a smoother path to net zero. By contrast, delayed action in the 2030s increases default risk as less progress this decade is likely to lead to higher degrees of intervention and a less orderly transition later.

- » In an 'Early Action' scenario, the impact on default risk for companies in the most exposed sectors is less than half what it would be in a 'Late Action' scenario. The electricity utilities sub-sector benefits from an enhanced risk profile overall in this scenario.
- » In a 'Late Action' scenario on a 30-year timeline, there is an average 10% increase in the probability that a company fails to meet its financial obligations across all geographies and sectors by 2050 – while the gas utilities sub-sector experiences a 100% increase in this probability of default¹⁰. The most exposed sectors would face default risks well above their highest recorded values in over 30 years of historical data.

SECTION 1

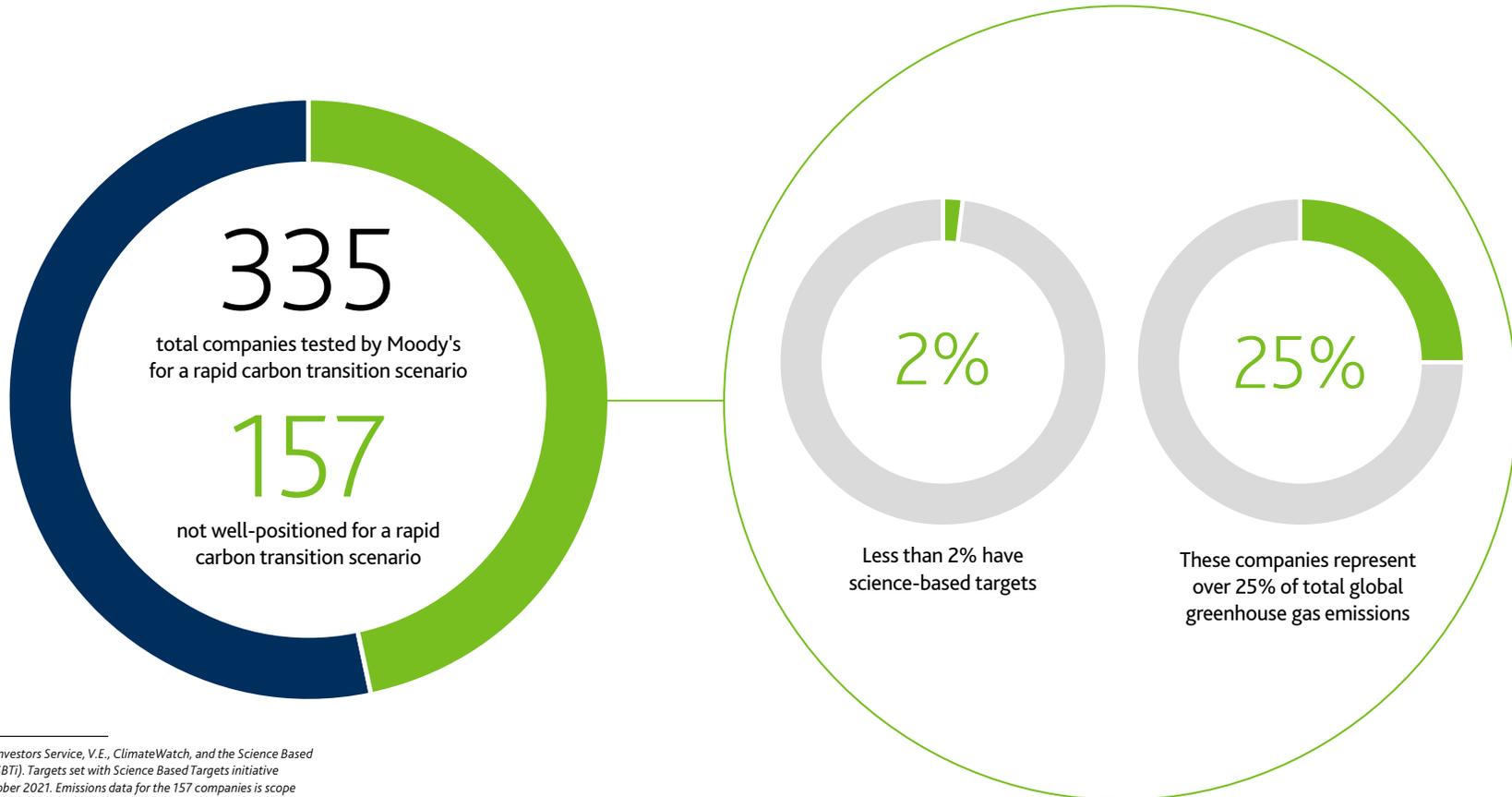
Which sectors are best positioned for rapid transition?



Momentum for rapid transition in the automotive and utilities sectors show that real progress is possible in some of the most carbon-intensive sectors.

Moody's Investors Service's proprietary Carbon Transition Assessment (CTA) scores for issuers in sectors with heightened exposure to transition risk indicate that many major emitters of greenhouse gases are not well-positioned for a rapid transition to a low carbon economy.

» Of the 335 issuers scored to date, including some of the largest companies in their sectors, 157 are not well-positioned for a rapid carbon transition as defined by the International Energy Agency's Sustainable Development Scenario (SDS).



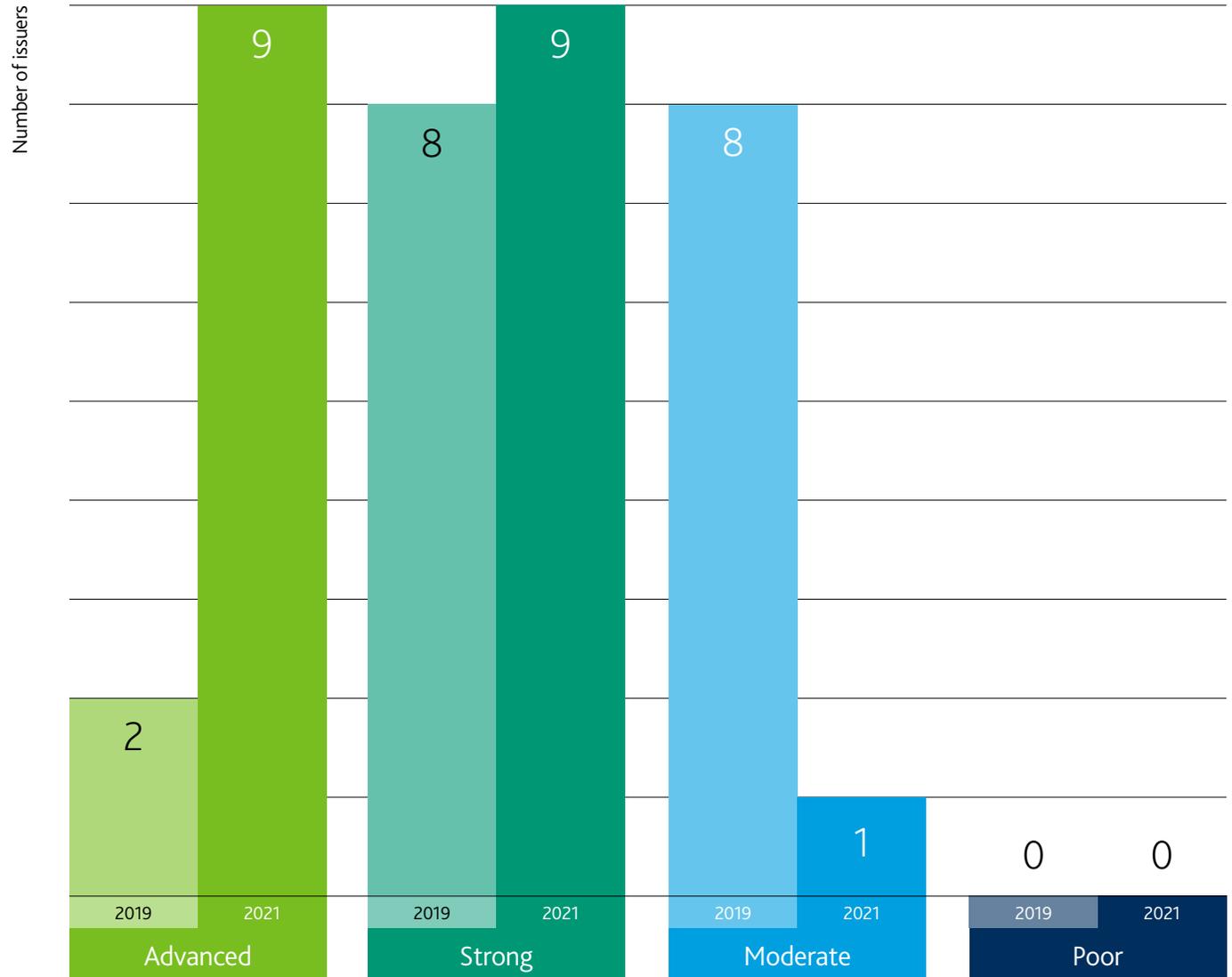
Sources: Moody's Investors Service, V.E., ClimateWatch, and the Science Based Targets initiative (SBTi). Targets set with Science Based Targets initiative (SBTi) as of 21 October 2021. Emissions data for the 157 companies is scope 1 + 2 + 3 for the latest available year from V.E.'s dataset and is either based on companies' disclosures or modelled. Global emissions data point is for 2018.

Yet the automotive and utilities sectors demonstrate that companies can adapt to structural change to mitigate risks and capture growth.

- » With the automotive industry implementing plans to shift away from traditional combustion engine vehicles, we scored 18 out of the 19 global automakers as having an 'advanced' or 'strong' position for a rapid carbon transition. Most automakers improved their score between 2019 and 2021, and the number of companies with improved positioning for a rapid transition increased by 80% over that timeframe. However, Electric Vehicle (EV) sales currently account for a small percentage of global auto unit sales, and there remains significant execution risk in this sector's plans.
- » Increasingly stringent clean air standards and continuing declines in the cost of renewable energy are also pushing electric power producers in Western Europe and the US to accelerate the retirement of coal-fired generation and the development of renewable power assets. As a result, issuers in the power generation sector along with the automotive sector received stronger median scores for their preparedness for a rapid transition scenario than other sectors.
- » Oil and gas companies are the least prepared for rapid transition. 82% of integrated Oil and Gas companies, 57% of Exploration and Production companies, and 70% of refineries are not well-positioned for a rapid transition. The airline sector also displays an overall lower level of transition preparedness than the other sectors analyzed.

Global automakers' positioning for a rapid carbon transition has improved

Distribution of global automakers' scores in 2021 and 2019 for Component D of our carbon transition assessment framework



Component D measures long-term exposure to a rapid carbon transition scenario envisioned by the IEA's Sustainable Development Scenario. Source: Moody's Investors Service.

However, current corporate decarbonization plans across the global economy are well off track for a 1.5°C world.

Moody's ESG Solutions also analyzed publicly stated decarbonization plans across the economy and from companies in carbon-intensive sectors, and modelled the implied global temperature increase if these companies were to execute those plans.

From an initial sample of around 2,700 of the world's largest and most valuable companies¹¹, we found that approximately 45% have set emissions targets and approximately 15% have targets that reference net zero.

We estimate the implied temperature rise from companies' stated targets by comparing their stated targets and projected carbon emissions with different decarbonization scenarios from the International Energy Agency (IEA). We find that the overall average implied temperature increase for these 2,700 companies is 2.6°C.

This analysis scored public companies in the sectors most exposed to carbon transition risk according to our environmental heat map.

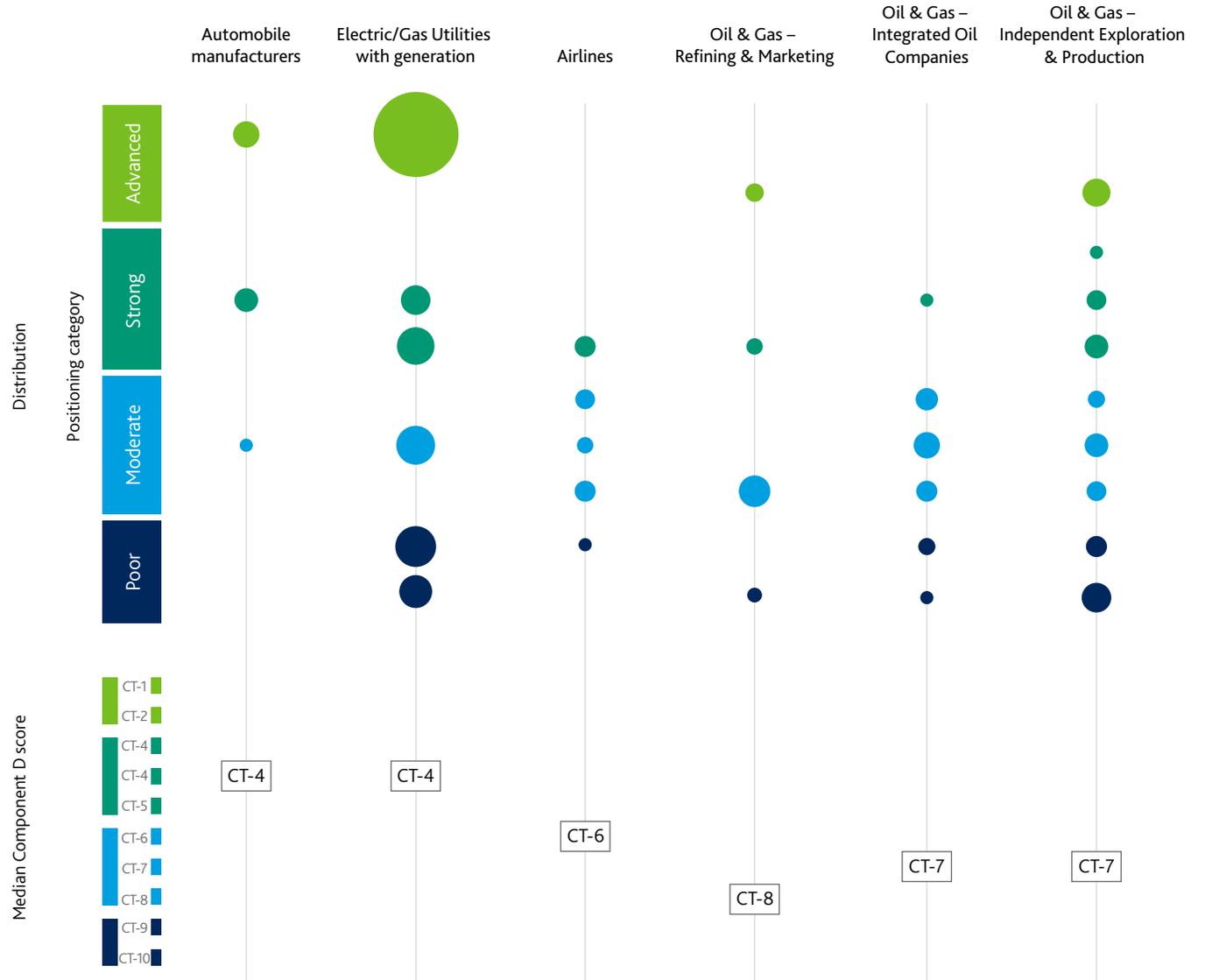
We focus on companies' readiness for the IEA's Sustainable Development Scenario: a "well below 2°C" scenario that is aligned to the outcomes targeted by the Paris Agreement, and with the pathway required for Net Zero by 2050 in advanced economies.

Of the 380 issuers that we have scored for overall carbon transition risk, 45 are utilities that do not own power generation assets. Under our Carbon Transition Assessment (CTA) framework for electric utilities and power generators, we assign separate flat scores to non-generation operations (e.g., electric transmission/distribution and gas transmission/distribution) because their risk profile differs from that of power generation. These 45 utilities are not scored under Component D of our CTA framework.

¹¹ *Moody's ESG Solutions analyzed an initial 2,700 larger cap companies as part of our Temperature Alignment product. Over time, the product will look at around 10,000 companies in total, and we note that the results included in this section are preliminary findings.*

Automakers and electric utilities are better positioned for a rapid carbon transition

Distribution of scores sector for Component D of our carbon transition assessment framework: exposure to rapid transition scenario



Bubble size represents number of companies. Source: Moody's Investors Service

The true direction is likely higher¹², as we assume that companies that have not yet set targets are approximately aligned with the IEA's 2.7°C Stated Policies Scenario (STEPS) – a likely generous estimate given that this assumes full implementation of the Paris Agreement nationally determined contributions and that these companies are likely to be below the average.

» Just 13% of companies have set targets that Moody's ESG Solutions is able to score under our Temperature Alignment framework¹³ – since many targets only focus on the immediate term rather than the period through to 2030, or they have insufficient detail¹⁴.

» Just 8% of companies in the oil and gas sector have set targets that include Scope 3, which accounts for the vast majority of lifecycle emissions.

» Even among those companies that have set quantifiable targets, the average associated temperature increase is 2°C. However, because these companies represent a small minority, overall conclusions are largely driven by the business-as-usual behavior of the rest of the market.

» We found an overall temperature increase of more than 2°C for every individual sector analyzed.

» 54% of electric & gas utility companies have so far set targets that we were able to assess under our methodology¹⁵, the highest rate of the focus sectors analyzed so far.

» The automotive and airline sectors have some of the lowest carbon target-setters. The companies that have set quantifiable targets in these sectors average well below 2°C, although we note that a large proportion of airline targets cannot be quantified. Though airlines are not well-positioned overall for a rapid transition, their target setting suggests that they may be mobilizing to adjust their strategies for a lower carbon future.

» The aluminum sector is one of the least mature, with even the subset of companies that have set targets averaging a temperature increase of 2.5°C. We note that these aluminum sector-level results are based on a relatively small sample size.

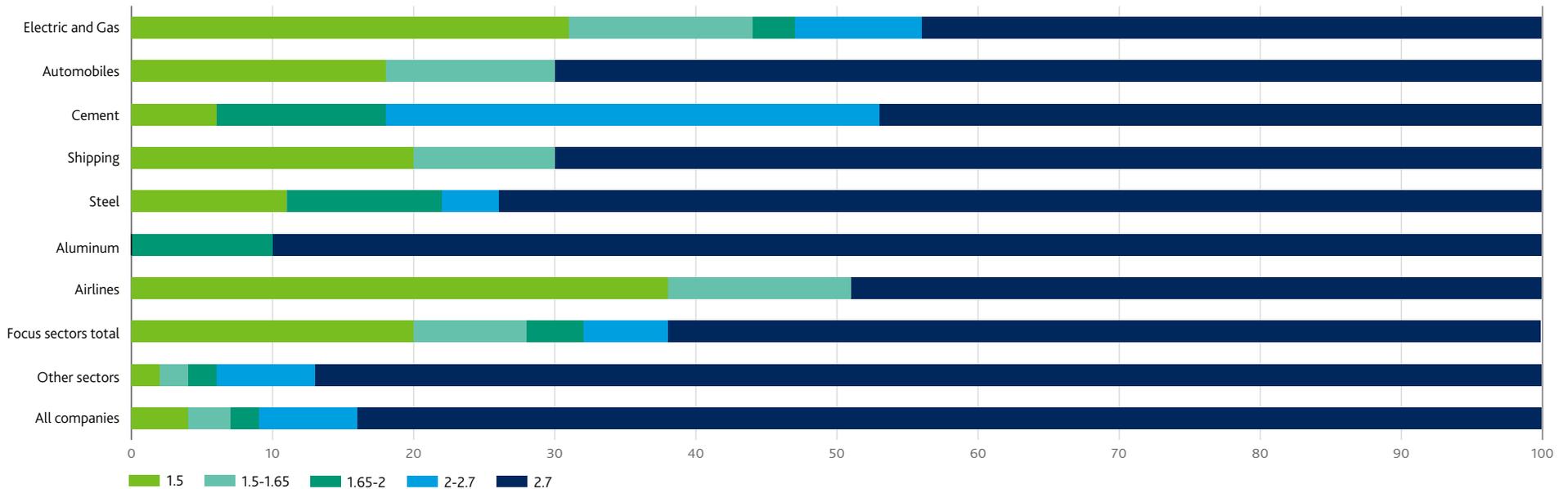
¹² We note again that we were only able to score 13% of company targets under our Temperature Alignment framework, and that the methodology currently does not currently capture all intensity targets from companies.

¹³ Under the Moody's ESG Temperature Alignment framework, emissions targets set by companies are compared to benchmarks drawn from scenarios developed by the International Energy Agency. Specific intensity benchmarks are used for eight key high-emitting sectors, and an absolute reduction approach based on an economy-wide benchmark is used for the remainder of the universe.

¹⁴ We note that this analysis only looks at larger cap companies, and that the whole economy percentages are therefore likely to be significantly lower.

¹⁵ This means that the targets are clear rather than general statements, that companies have disclosed emissions data, and that they extend to at least 2030 rather than solely focusing on the immediate term.

Temperature score distribution (with companies with no targets included as 2.7°C)



We use the IEA scenarios as benchmarks, focus on near term performance through to 2030, and minimize making assumptions or projecting what companies might be doing in the future.

SECTION 2

How wide is the disclosure gap today?

Transparency on critical climate risks is vital for capital markets because what gets measured gets managed.

There are signs of progress on climate risk disclosure, but there is significant room for additional and better disclosure to fully assess companies' preparedness for transition.

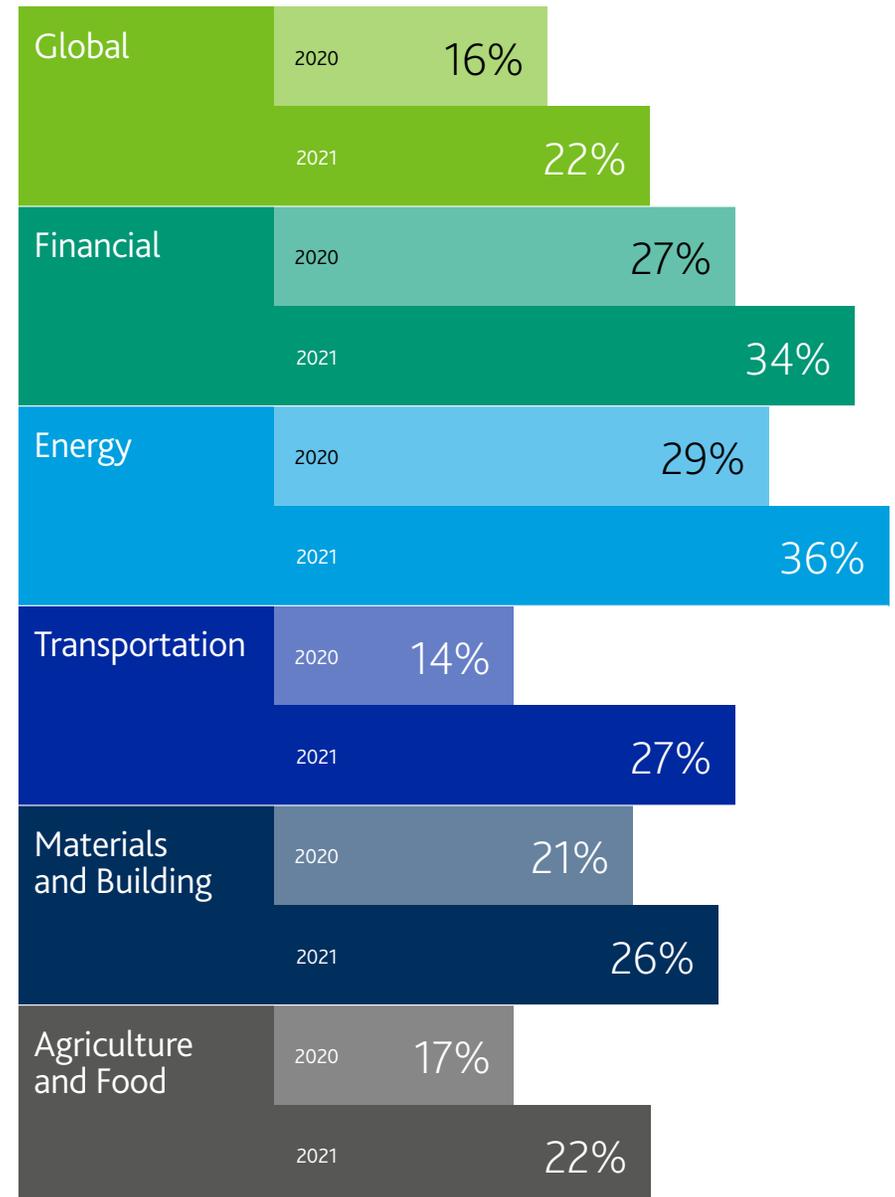
Moody's ESG Solutions found an average disclosure rate of 22% across all sectors¹⁶ on all 11 recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) in 2021, a solid improvement from 16% the year prior.

While 58% of the companies we researched disclose their carbon footprints using Scope 1 and Scope 2, only a minority provide detail on Scope 3 – and there is significant variation in the quality and comprehensiveness of their disclosures on Scope 1 and Scope 2¹⁷.

» Just 13% of companies disclose conducting scenario analysis and seeking to understand the potential business impacts, a key recommendation of the TCFD. Only 19% of companies provide disclosure on climate risk identification and assessment, although this represents a marked improvement over last year where just 8% provided such disclosure.

» Transport & Logistics is the most improved sector year on year, increasing the disclosure rate across all 11 TCFD recommendations to 27% (from 14% in 2020). Energy¹⁸ is the sector with the highest overall disclosure rate on this metric (36%) and also leads on disclosure of risk management: 50% of companies disclose risk identification and assessment process, while 32% disclose integration in risk management.

Average disclosure rates by sector groups

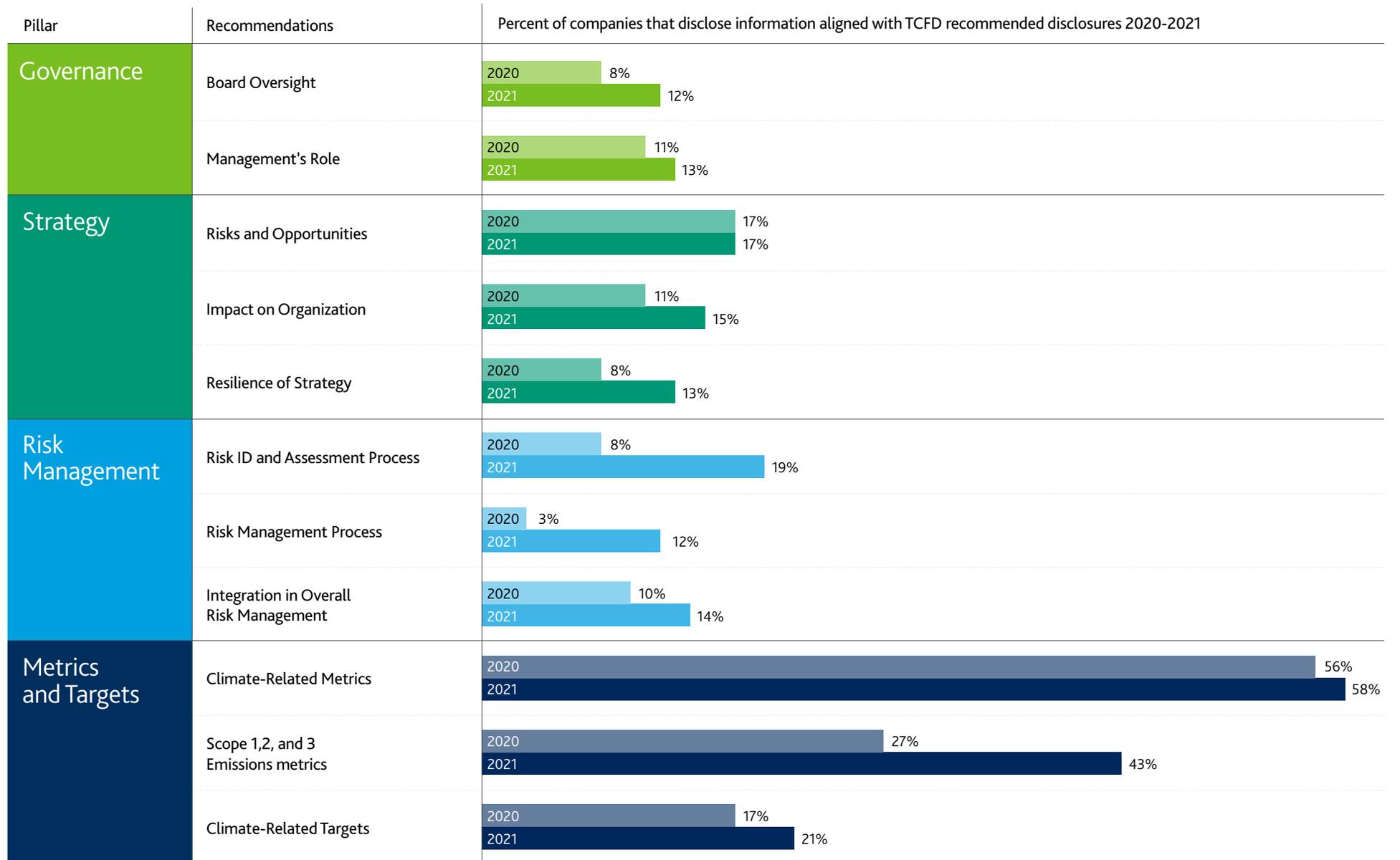


¹⁶ From a sample of over 3,800 larger cap companies.

¹⁷ Scope 1 covers direct emissions from sources that the company owns or controls. Scope 2 covers indirect emissions sources which the company uses or purchases. Scope 3 covers all other indirect emissions that occur in a company's value chain.

¹⁸ The energy sector here refers to companies involved in oil and gas exploration, production, and downstream activities, oil equipment and services companies, and electric and gas utilities.

TCFD – Aligned disclosure rate by year



SECTION 3

How could transition
preparedness influence
default risk?

The transition to net zero will likely have significant and uneven implications for probabilities of default.

Using our credit models, Moody's Analytics assessed the impact of both a rapid transition this decade and a delayed transition from 2030 onwards. The universe of companies analyzed consists of nearly all publicly traded companies worldwide: more than 32,000 in over 100 countries.

The analysis considers two scenarios based on assumptions set out by the Network for Greening the Financial System, which are widely used to stress test central banks and financial institutions for exposure to climate risk. The results were evaluated for both short term (five years) and mid to long term (30 years) impacts.

Early action

Assumes government climate policies and corporate decarbonization actions are introduced early (in the 2020s) and become gradually more stringent.

Net zero CO₂ emissions are achieved before 2070, giving a 67% chance of limiting global warming to below 2°C. The policy reaction under this scenario is immediate and smooth, technological change is fast, and there is medium use of carbon dioxide removal.

Late action

Assumes government climate policies and corporate decarbonization actions are not introduced until the 2030s.

Since actions are taken relatively late and limited by available technologies, emission reductions need to be sharper than in the Early Action Scenario to limit warming to the same target. The result is higher transition risk. Under this scenario the policy reaction is delayed with low use of carbon dioxide removal and high variation in regional policy.

- » In a Late Action scenario, the most exposed sectors face probabilities of default well above their highest recorded values in over 30 years of historical data.
- » In an Early Action scenario, impact on default risk in the 10 most exposed sectors is less than half what it would be in a Late Action scenario.
- » In both scenarios, at least 10% of firms across all sectors emerge stronger in terms of default risk profile.

Delaying action until the 2030s has the greatest negative impact on default risk for carbon-intensive sectors compared to the Early Action scenario. Not acting during the 2020s carries higher costs and risks into the future, as the necessary measures to catch up will equate to higher degrees of intervention and a shorter time to absorb these changes. In a Late Action scenario over a 30-year timeframe:

- » There is an average impact of close to 40 basis points on Probabilities of Defaults (PDs) across all 30K+ firms we surveyed. This increase amounts to a 10% jump in the probability that a company fails to meet its financial obligations across all geographies and sectors by 2050.
- » 70% of the industries in our analysis (43 out of 61) are expected to experience an average 2.5% rise in PDs – a relatively small effect on their risk profiles.
- » However, some sectors face a significant impact. Oil and gas related sub-sectors experience average increments on their PDs of 200 basis points or higher. This implies a 40% to 80% increase in their PDs¹⁹. Gas utilities experience a close to 100% increase in their PDs. The most exposed sectors face probabilities of default well above their highest recorded values in over 30 years of historical data.
- » Other sectors that experience meaningful increase in default risk are mining and steel.

By contrast, companies and governments taking early action during the 2020s enables the global economy to chart a smoother path to net zero.

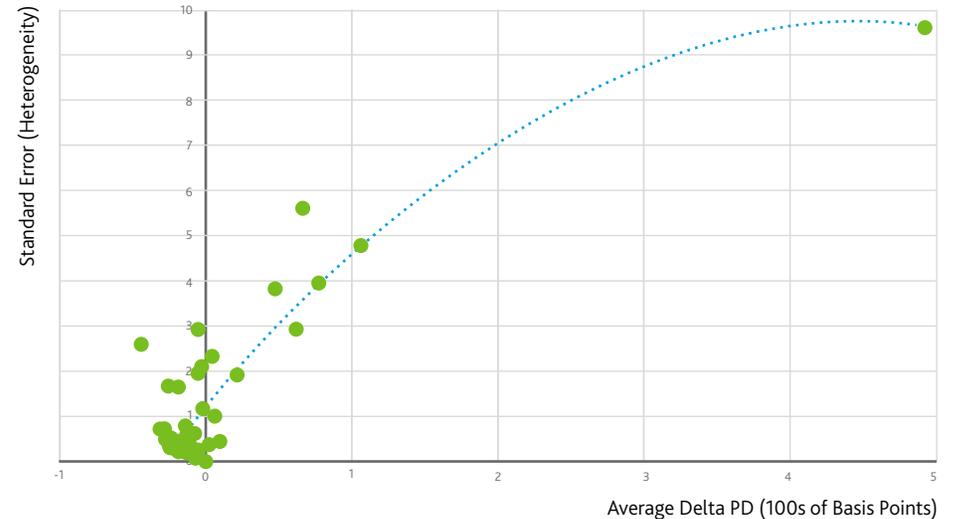
- » In an Early Action scenario, impact on default risk in the 10 most exposed sectors is less than half what of it would be in a Late Action scenario.

In both scenarios, there is clear divergence in default risk at both the sector and individual company level. Some sectors as a whole stand to benefit significantly from rapid action, while the companies that are best placed for transition – even within sectors that are exposed overall – pull away from their peers.

- » At least 10% of firms across all sectors emerge stronger in terms of default risk profile. These companies adapt to change efficiently, embrace the opportunities that emerge as the economy around them transforms, and may strengthen financial performance as a result.
- » Some sectors benefit from an enhanced default risk profile in the Early Action scenario due to the rapid growth in low carbon technologies and more efficient energy use. That includes construction, electricity utilities, textiles, and apparel – four sectors that are carbon-intensive today – as well sectors that are less carbon-intensive like publishing and entertainment.
- » Automotive does not benefit from an enhanced profile overall in an Early Action scenario, but experiences a relatively small PD increase of 10 basis points over a 5 year timeframe.
- » We also see the greatest variation of individual company performance within the most exposed sectors. The following charts plot the average change in probability of default (PD) for firms in each sector (x axis) against the variability of PDs within that sector (y axis).

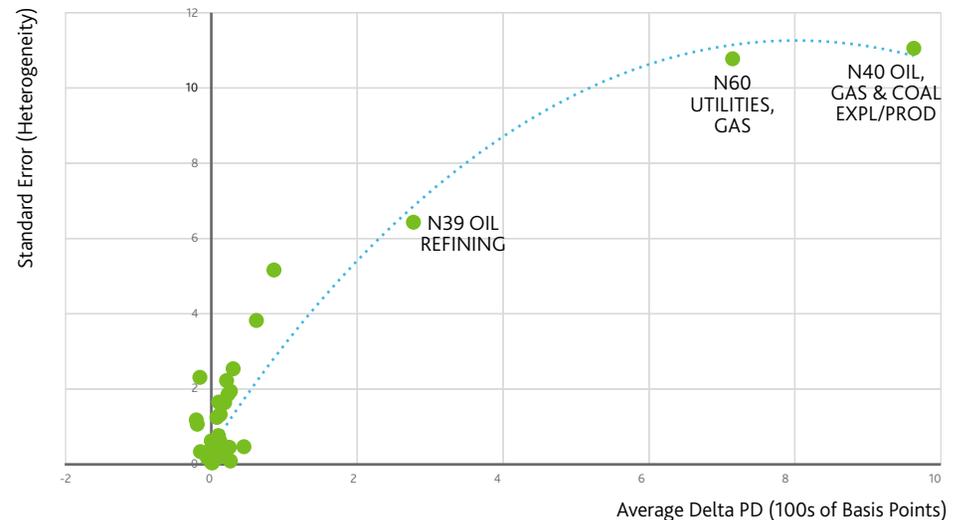
Impact on Default Risk (Delta PDs – 5Y)

Industry-level Observations – Early Policy Scenario



Impact on Default Risk (Delta PDs - 30Y)

Industry-level Observations – Late Policy Scenario



¹⁹ When compared to a base-case scenario.

SECTION 4

What will it take to prepare for rapid transition in carbon- intensive sectors?

The positive shift in the number of companies that are better positioned for a rapid transition in the automotive and utilities sectors demonstrates that significant progress is possible in preparing for decarbonization.

Other sectors face a fundamental challenge to align with a lower carbon future without major technology breakthroughs or business model changes.

Early action can reduce companies' default risk and may improve financial performance, in particular in sectors that are carbon-intensive and highly exposed to transition risk today.

The financial system has a profound role to play in repricing climate risk, and supporting sustainable and resilient investments in sectors and companies that align with a lower carbon future and enable solutions to climate change.

Initiatives that aim to align on sector pathways and share best practices to get to net zero faster will play an essential role, like the Race to Zero, the Glasgow Financial Alliance for Net Zero, and the Science Based Target Initiative.

The next ten years are critical to the well-being and prosperity of generations to come. At Moody's, we are doing our part by committing to reduce our own operational emissions and helping market participants by aligning all of our relevant products and services to achieve net zero greenhouse gas emissions by 2050.

Moody's is determined to tackle the growing climate crisis, and has committed to [achieve net-zero emissions](#) across our operations and value chain by 2040 and to [align all relevant products and services](#) to achieve net-zero greenhouse gas emissions by 2050 as part of the Glasgow Financial Alliance for Net Zero. Moody's has also set and progressed on validated, interim net-zero science-based targets. Progress on these targets can be viewed in Moody's recent [TCFD Report](#) and [Stakeholder Sustainability Report](#).

Learn more about Moody's climate efforts on our [Climate Hub](#).

To find out more
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climate efforts, visit

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