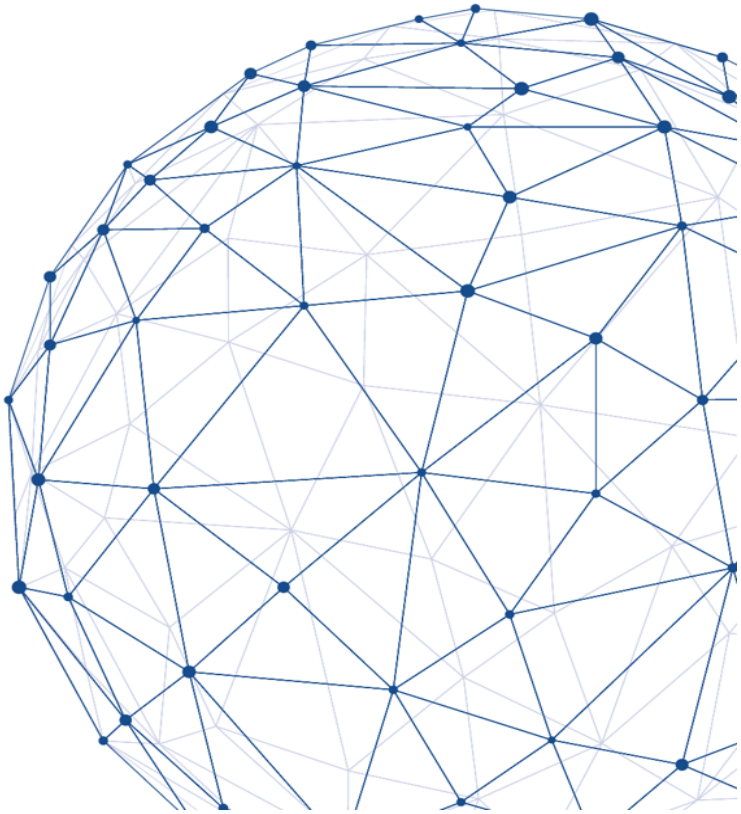
ESG considerations for the credit ratings of automotive manufacturers and suppliers

The automotive industry faces significant ESG challenges throughout the value chain. Greater scrutiny from regulators, policymakers and investors has made the industry accelerate the shift to ultra-low and zero-emission vehicles from those powered with internal combustion engines. Also in the spotlight is a reduction in the sector's environmental footprint up and down the supply chain as the focus on more sustainable manufacturing intensifies. These changes have profound consequences for the industry's workforce and suppliers. This document explains our view on the most relevant ESG factors in rating the creditworthiness of the sector.

Scope Ratings GmbH, 30 July 2024



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1. General ESG framework at Scope

Our ESG framework evaluates the extent to which ESG factors are credit-relevant for different industries. We also provide an overview of how ESG factors are integrated into our credit analysis. Our evaluations are not mutually exclusive or collectively exhaustive as these factors overlap and evolve. Reporting standards for these non-financial key performance indicators are undergoing major changes, shedding more light on stakeholders' understanding and expectations of ESG. We therefore aim to update the framework on a regular basis.

Our corporate credit rating analysis remains focused on credit quality and credit assessment drivers. We only consider an ESG factor relevant to our credit rating process if it has a ubiquitously discernible and material impact on the rated entity's cash flow profile and, by extension, its overall credit quality. Contrary to ESG ratings, which are largely based on quantitative scores for different rating dimensions, credit-relevant ESG drivers are mostly of a qualitative nature. Hence, identified ESG rating factors are based on an opinion in a relative context.

The importance/relevance of certain ESG factors is specific to each rated entity, industry and region, except for the dimension of governance, which is universally applicable across all industries and relevant to all rated entities. Governance is an indication of how well a corporation is controlled and directed and the extent to which the interests of different stakeholders are safeguarded, including the payment of all due amounts on time and in full. In contrast, environmental and social variables capture risks and opportunities that are often specific to the activities of a company and the industry in which it operates. For example, the risk of pollution and environmental damage is important in the utilities, chemicals and natural resources industries but less relevant to the retail sector, where governance and social factors are more relevant. The same applies to an assessment of ESG-related factors that might have a significant impact on a company located in western Europe but no effect on an eastern Europe corporate with a similar business model. A good example is the impact of regulatory risks, which may be significantly greater in some jurisdictions.

All such factors may have a direct or indirect impact on all the rating elements which make up our assessment of an issuer's business risk profile, financial risk profile and supplementary rating drivers. We provide a list of ESG factors that we normally consider for a given industry, although only some of the factors listed are likely to apply and be relevant to any given company.

ESG rating drivers are part of the rating framework that is outlined in our general rating approach in addition to our specific approach to the sector: see our European Automotive Suppliers Rating Methodology and Automotive and Commercial Vehicle Manufacturers Rating Methodology.

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Contents

2. Important ESG themes in the automotive industry

The global automotive industry is undergoing profound change because of technology-driven trends, increasingly stringent environmental regulations, changing consumer preferences and a wider societal shift towards the use of products with a lower environmental impact.

Under growing pressure from regulators, governments and investors, the automotive industry faces momentous challenges in achieving the sustainability goals defined by the Paris Agreement, the European Green Deal and the 2030 United Nations Agenda. The industry transformation also requires a parallel transition in other crucial upstream sectors (energy, oil & gas) to achieve carbon neutrality by 2050.

We view the climate transition as the most prominent ESG risk for the automotive industry. The industry is relatively unfavourably positioned compared with many other industries as a high proportion of environmental factors which affect it are in the scope-3 category – the sourcing, extraction and/or manufacturing of key raw materials, the impact of vehicles on the environment and human health – as opposed to scope-1 and scope-2 emissions related to the manufacturers' own activities.

Transportation accounts for about one quarter of global greenhouse gas (GHG) emissions. More than 70% of transport-related emissions come from road vehicles. The auto industry consequently needs to drastically reduce GHG emissions and to improve its environmental impact.

At the same time, we acknowledge that road transport is one of the cornerstones of the global economy: the transition to electric mobility will only happen at a pace that is politically and economically viable, and that speed of change is likely to vary in different parts of the world.

Addressing climate change and reducing pollution, amid growing concerns about the impact of vehicle emissions on public health, could prove to be a long, costly and painful journey for the whole industry, original equipment makers (OEMs) and suppliers alike. The shift from road vehicles powered by internal combustion engines (ICEs) to zero-emission electric vehicles (ZEVs) is transforming the automotive value chain and reshaping the competitive landscape. This is putting considerable pressure on legacy automotive players, forcing them to rethink their business models and product portfolios, convert their manufacturing facilities, realign their labour structures and face economic and strategic trade-offs, with limited visibility on their future return on investment.

We have identified the following four main themes relevant for the automotive industry as a whole and for our environmental, governance and social assessment that could affect an automotive manufacturer's or supplier's creditworthiness.

- Climate transition risks and decarbonisation strategies
- Resource efficiency, circularity and product innovation
- Workforce transformation, supply chain management and responsible production
- Regulation, political intervention and reputational risks

2.1. Climate transition risks and decarbonisation strategies

Concerns over climate change have become a top priority for policymakers in major developed countries including China in the past decade, with the European Union clearly leading this battle. The focus in Europe has gradually shifted from emissions of harmful pollutants[1] to GHG emissions[2], supported by the 2015 Paris Agreement[3] and the EU's target to achieve climate neutrality by 2050.

Based on the current state of technology, vehicle electrification is one of the main levers for reducing road transport emissions. A battery electric vehicle (BEV) emits less CO_2 than its internal combustion engine (ICE) equivalent during the use phase and, more importantly, over the entire life cycle, regardless of the local electricity mix, according to the current scientific consensus. The EV carbon footprint is expected to decrease further through the shift of the electricity grid to larger concentrations of carbon-neutral power as generating electricity from wind, the sun and, in some countries, nuclear power and hydro-electric dams increases.

For EVs to be widely adopted, there are several preconditions: the construction of a wide network of smart EV charging infrastructure, government incentives, affordable prices, cheap electricity, and sufficient electric grid capacity. Building such an EV "ecosystem" will require the collective efforts of all stakeholders, not just OEMs and their suppliers.

However, vehicle-fleet electrification alone will not suffice and provides no guarantee of achieving the Paris agreement's 1.5°C long term goal. Other changes are necessary, concurrently or in stages. This includes the accelerated phase-out of hydrocarbon-powered vehicle fleet, encouragement of other the forms of mobility (from walking and cycling to public transport and ride sharing among others), reducing the reliance on roads for transporting freights[4] and the expansion of renewable energy sources, including the systematic use of green electricity.

The climate transition has far-reaching implications for the whole automotive industry, with the required adaptations transforming business models as manufacturers shuffle product portfolios to comply with increasingly stringent emissions regulations.

For OEMs, adjusting to these changes and the associated decarbonisation commitments requires significant upfront capital expenditure and R&D spending. This includes creating new purpose-built vehicle architectures, deploying a wide range of electrified models, repurposing existing ICE factories for EV production, ensuring access to battery-cell production capacity (the so-called gigafactories) and securing supplies of critical raw materials.

In addition, most OEMs intend expanding their vertical integration to control a higher share of the BEV value chain (70/80% vs 45/50% for the ICE value chain). This is already visible in the substantial multi-year investment plans launched by automakers in the past few years. Such spending may last for much longer than currently planned. In addition, OEMs may need to invest in charging infrastructure to accelerate the adoption of BEVs. However, there is limited visibility on the potential return on such investments for various reasons.

First, the EV technology is still immature and subject to rapid changes which may impact battery performances and residual values of current EVs. Secondly, consumer behaviour remains unpredictable, with residual hesitancy in shifting to BEVs visible in the current slowdown in the pace of EV adoption after three years of strong uptake[5]. Thirdly, the regulatory environment remains unstable in many regions, subject to changes government policy depending on the electoral calendar, with much at stake in 2024, given the growth in popularity of far-right and centre-right parties, often sceptical over the benefits of climate policy, in elections for the European Parliament and in France and uncertainty over the outcome of the US presidential election in November.

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1 The main air pollutants emitted by vehicles include carbon monoxide, hydrocarbons, nitrogen oxides, non-methane volatile organic compounds, ammonia and particulate matters.

2 Besides carbon dioxide (CO_2), the main greenhouse gases include methane (CH4), nitrous oxide (N2O), sulphur hexafluoride (SF6), hydrofluorocarbons (HFCs) and ozone depleting chlorofluorocarbons (CHFs).

3 The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit this increase to 1.5°C.

4 In Europe, road transport remains the dominant transport mode, representing more than three quarters of all inland freight movement. Despite some diverging views on the environmental benefits of modal shift, rail is seen as the least polluting and most energy-efficient alternative mode of transport.

5 The global share of electric light vehicles (including rechargeable hybrids) rose to 14% in 2022 from just over 4% in 2020.

In any case, the shift to an electric world will continue to put pressure on the sector's profitability: it costs more to make hybrid and electric vehicles than ICE vehicles. Reaching ICE/EV cost parity will not be easy nor linear as it primarily hinges on lower battery-pack prices[6], efficient battery technology and economies of scale. Auto manufacturers are currently stepping up their efforts to cut EV-related costs to address the slower-than-expected improvement in EV contribution margins (revenue minus variable costs) due to the price war initiated by Tesla Inc. since early 2023 and the growing competition from low-cost Chinese EV manufacturers.

The structural shift is transforming the entire automotive industry and reshaping the competitive landscape. This will likely contribute to lowering the industry's barriers to entry and provide relatively new industry entrants such as Tesla and Chinese OEMs with an opportunity to leapfrog legacy ICE-focused rivals.

All in all, the adverse credit implications for legacy automakers include downward pressure on profits and cash flow, potential impairment of existing projects or previously capitalised development costs and the risk of current ICE production facilities and assets turning into stranded assets.

In the commercial vehicle sector, decarbonisation is a more complex and lengthier process, and one on that policy makers have focused on only recently. In the EU, even though the sector is responsible for 27% of climate emissions from road transport, medium- and heavy-duty vehicles were not subject to CO_2 emission regulation until 2019. Binding CO_2 targets are applicable only from 2025. No 100% zero-emission target has been set for now. According to NGO Transport & Environment, zero-emission vehicles, comprising battery-electric and hydrogen fuel-cell electric vehicles are the only available and credible technology capable of fully decarbonising this segment in the long run. While the decarbonisation of heavy-duty trucks used for long haulage will take time for technical reasons, the decarbonisation of 'last-mile delivery' operations should be quicker due to the rapid expansion of the supply of electric delivery trucks, supported by innovative technologies such as inductive (wireless) EV charging. Tighter future regulations could increase the credit risks associated with the commercial vehicle industry.

For automotive suppliers, electrification entails both challenges and opportunities. Many suppliers involved in propulsion technologies are redirecting their investments towards alternative drive systems, hybrid and electric vehicle components and more energy-efficient combustion engine components during the transition period. Opportunities will arise for those suppliers capable of adjusting their portfolio mix or exposed to the right business lines (ranging from battery pack housing to advanced electric/electronic components).

Conversely, the EV transition is a serious challenge for highly specialised suppliers active in conventional engines, transmissions, fuel injection systems or exhaust systems. Most of them will not be able to redefine their business model and may ultimately be forced to exit the market. Traditional aftermarket component manufacturers will also face lower demand unless they manage to reposition themselves, for instance in software-related activities.

Electrification of vehicle powertrains means fewer but different components and manufacturing equipment compared with those needed for ICE vehicles due to significant changes to the vehicles' architecture and content. According to market research, a typical conventional ICE vehicle contains up to 30,000 component parts while a battery-electric vehicle comprises 50% fewer parts, including 10 times fewer moving parts. As the share of software value is steadily increasing with in ICE and particularly EV architectures, some traditional hardware components will become obsolete or commoditised.

Another risk for automotive suppliers is the probable reduction of their addressable market as OEMs develop and produce their own electric powertrains and related components to retain a greater share of added value.

[6] Batteries are the main single cost component of battery-electric vehicles, accounting for around 40% of their manufacturing costs. The high cost of batteries is the main factor explaining why BEVs are still much more expensive than their ICE counterparts.

Relevance to our rating approach:

Climate transition is the most prominent ESG factor for the automotive industry as it entails significant costs and risks. When assessing how an automotive company addresses the risks related to climate change, we analyse the issuer's efforts to comply with fuel economy and CO_2 emission reduction targets as well as its actions to achieve carbon neutrality.

Regarding electrification, we look at the company's readiness, how fast it can deploy a zero-emission product offering, the depth of its eco-system and its access to sufficient battery capacity. We also examine how the company is tackling the competitive, industrial, and social implications of the EV transformation and how it finances the EV transition. We analyse the issuer's capital allocation decisions and their impact on short-term and medium-term free cash flow generation.

As the investments required for the electric mobility are potentially massive, we expect industry players to be more selective in their capital spending. This may involve several types of partnerships along the value chain, among OEMs, between OEMs and technology specialists, or battery and cell manufacturers to share costs and knowhow. To finance the transition, attract external funding and benefit from higher stock market valuations, several players opted for a radical overhaul of their business structure, leading to a separation of their EV business from their legacy ICE-related operations via an IPO or spin-off. However, the recent uncertainty surrounding the growth of EV penetration has deterred some players to proceed with the planned IPO of their EV-related units.

Broadly speaking, the higher costs associated with decarbonisation and pollution-reducing technologies may not be recouped through price increases or mitigated by efficiency gains, thus undermining the industry's profitability. The industry is faced with multiple trade/offs. A fast transition toward net zero reduces the timespan available for maximising cash flows from the legacy ICE portfolio while a slow transition increases the risk for the industry to be subject to tougher regulatory and fiscal pressure, which could reduce profitability and cash generation.

In addition to pressure on profits and cash flow, negative credit implications for legacy OEMs include potential asset write-offs and project impairments, combined with an increasing risk of stranded assets.

Conversely, the climate transition may have positive credit implications for the best-positioned automotive suppliers.

We also monitor management incentives to reduce a company's carbon footprint, for instance by incorporating sustainability KPIs into performance targets and linking management compensation with actual GHG emissions reduction and progress relative to the relevant peer group.

2.2. Resource efficiency, circularity and product innovation

Resource management

The topic of resource conservation is more relevant than ever for the automotive industry, which is under increasing scrutiny by governments, regulators and NGOs. The industry is striving to optimise the use of natural resources (water, energy), minimise product and production waste, increase the use of renewable energy notably in manufacturing. Some progress has been made in terms of resource preservation in Europe. According to the European Automobile Manufacturers' Association (ACEA), the water consumption per passenger car produced has been reduced by over 34% in the EU since 2005 thanks to increased application of recirculation technologies. Likewise, energy consumption per car produced has been reduced by around 6% since 2005 despite increased complexity in vehicle manufacturing. We expect greater focus on the use of renewable energy in the years ahead.

Circularity

The automotive industry is increasingly implementing circular economy[7] principles to reduce its material & energy consumption and carbon footprint along the value chain. Circularity also provides some hedging against energy and raw material price volatility and disruptions in the supply chain.

OEMs and suppliers are trying to reduce waste and create closed-loop systems for materials and products: more use of recycled and secondary materials and development of end-of-life solutions. For any product (vehicles, parts and components), for this circular approach to work, it needs to start as early as possible in the development process, ideally during the design phase to facilitate future disassembly, recycling, repurposing and upgrading.

For electric vehicles, most of the carbon footprint originates from the upstream value chain and not from production. As vehicle electrification is gathering speed, it is crucial for the industry to optimise the use of primary materials involved in making batteries, principally lithium, cobalt, nickel, graphite, manganese and aluminium. The extraction and transformation of these minerals is energy intensive and consumes significant resources (e.g. water in the case of lithium) while they are sometimes associated with illegal activity such as the use of child labour on cobalt mines in the Democratic Republic of Congo (DRC) – see **page 10**.

Such optimisation would also help keep the costs of EV batteries under control if not reduce them.

In the context of shortage and price inflation for critical materials, OEMs and battery manufacturers need to step up recycling to recover as many materials as possible from the battery packs returned at the end of their lifecycle. However, this is a challenge due to the complexity of battery designs, technologies and chemistries. Fortunately, used batteries that are no longer eligible for EV applications can be given a second life in less demanding applications such as stationary energy storage at wind and solar power plants or to power buildings.

The development of circular economy can also offer growth opportunities thanks to innovative business models that will generate new revenue streams through remanufacturing, repairing, reselling or upcycling in addition to economising on resource consumption and simplifying supply chains.

Product innovation

The automotive industry has a long-standing reputation for innovation. Automotive companies (primarily OEMs) are among the top corporate R&D spenders in the world, along with technology and pharma/healthcare companies, and among the most active in filing patents. Over the past decade, the auto industry has invested massively to address connectivity – seamless connection between cars and smartphones – and autonomous driving in addition to devoting increasing R&D budget to ensure their products meet tightening environmental regulations.

However, the transition to EVs presents legacy OEMs with the challenge of adapting to a different set of technologies, manufacturing processes and supply chains to which their old R&D expertise may not relevant. They face competition from new entrants, most famously Tesla but also several Chinese EV-based OEMs which do not have without the drag of legacy ICE-related activities. There is still room for legacy OEMs to become leading innovators in EVs. Some technologies could be game changers, such as solid-state batteries, which have significant advantages over current lithium-ion batteries (higher energy density allowing much improved range,

[7] As opposed to the traditional linear model (take-make-use-dispose), the circular economy concept aims to decouple economic growth from finite resource consumption by eliminating waste, maximising product and material utilisation, extending product lifespans and extracting value at all levels.

faster charging, safer, lighter). Japan's Toyota Motor Co., which has historically championed hybrid- and hydrogen-fuelled cars, announced last year a breakthrough in the production process of its solid-state batteries in development.

Automotive players, particularly equipment suppliers, are more exposed to substitution risks if they lack the capacity for innovation. Companies in this category are vulnerable to losses in market share and weaker competitive positioning, particularly as suppliers typically offer OEMs discounted prices on less innovative and more mature products, hence the incentive them to invest appropriately in R&D.

Relevance to our rating approach:

There are clear benefits for automotive players that make a more efficient use of resources, reduce waste generated and expand the use of renewable energy sources. While the transition to more sustainable materials and energy sources can be expensive in the short term, this approach will help to reduce costs in the long run.

There are strong incentives for automotive players to increase the use of recyclable products and develop circular business models which can generate sizeable cost savings. This is more relevant in the context of rising input costs. In the medium to long term, circularity may also generate incremental revenue streams for those players with adapted business models. In addition, an effective implementation of circular economy can enhance a company's green credentials for investors.

Innovation is a differentiator in a fast-changing market sensitive to technological change. Automotive players which rapidly develop, integrate, and implement technologies compatible with the energy transition, digitalisation and shifts in transport preferences will be better placed strategically and financially. Conversely, those with less success in innovation are vulnerable to the commoditisation of their products and reduced competitiveness.

2.3. Workforce transformation, supply chain management, responsible production

Structural shifts that the automotive sector is facing such as electrification and digitalisation together with the greater regulatory and management oversight of supply chains, notably for raw materials, all have important ramifications for the industry's workforce and that of its suppliers.

Workforce transformation

The energy transition is perhaps the most important but not the only one transformative long-term trend the industry is facing. The issues of car connectivity, autonomous driving, shared mobility and electrification are collectively known as CASE. Digitalisation and artificial intelligence are important forces for innovation and performance optimisation. The car of the future will be increasingly defined by software and electronics rather than hardware and mechanics, as we see in the rise of software-defined vehicle architectures (SDV). These trends have only just started to disrupt the traditional automotive workforce.

This industry transformation has significant social implications. It requires new jobs and new skillsets for people employed along the value chain, i.e. more digital experts, data scientists, software and coding specialists than mechanical engineers. As automotive players, technological firms and other companies are competing for the same pool of talent, skills shortages loom in the years ahead. Automotive companies need to be proactive to ensure that the existing workforce is well prepared and that they recruit and train new staff with this transition in mind.

As a result of the ramp-up of electrification combined with the gradual phase-out of ICE vehicles, many ICE-related businesses are set to disappear, notably among automotive suppliers. It is hard to quantify the likely magnitude[8] of potential job losses but the direction is clear in our view.

These potential job losses can only be partially mitigated by the creation of new positions (e.g., software, electrical & electronics engineers…) and natural attrition as older workers retire. This sobering prospect could weigh down on the labour-relations climate in the industry particularly in the unionised sector in the US and Europe unless organised labour and management succeed in working through the challenges together.

Remaining competitive in this rapidly changing environment will require comprehensive re-training, re-skilling and education. Even then, many members of the existing workforce may not be fit for this new era. One offsetting factor might be the shift to higher vertical integration in EV manufacturing if it provides job opportunities for those employees otherwise at risk of being made redundant.

Supply chain management

Automotive supply chains are complex as they involve multiple tiers of suppliers across the globe. Supplier diversification is instrumental in maintaining business continuity and avoiding costly shortages. A close monitoring of direct suppliers and oversight of lower supply chain tiers can help secure sourcing, detect potential risks at an early stage and potentially avoid supplier failure. Good and stable relationships with suppliers can prevent damaging business interruption or reputational risks.

One big challenge facing global supply chains is the lack of visibility which may lead to business instability, affecting the whole ecosystem. The industry has suffered numerous supply disruptions that have led to shortages of critical components, production losses and subsequent price inflation. This is best illustrated by the worldwide domino effects triggered by the March 2011 earthquake in Japan on the semiconductor market and the massive chip crisis which started well before the Covid-19 outbreak and culminated in 2021-2022. Early 2022, the war in Ukraine prompted a sudden shortage of wiring harnesses which forced numerous European car factories to stop production for weeks. This was a painful reminder of the industry's vulnerability to high supply concentration and prompted carmakers to find alternative low-cost manufacturing locations and explore more automated methods for making wire harnesses in the future.

[8] The German automotive association VDA estimated that the switch to e-mobility could cost as many as 170,000 jobs in the German auto industry and up to 300,000 jobs including the upstream and downstream sectors. A 2021 study by the European Association of Automotive Suppliers (CLEPA) estimated that electrification could lead to between 275,000 and 410,000 job losses in the supplier segment in Europe by 2040, depending on the speed of EV adoption.

Ensuring continuous availability of raw materials, parts and components is essential. Recent supply bottlenecks have prompted some industry players to increase safety stocks, as a temporary response while others are considering expanding dual sourcing strategies. Besides, the rapid shift to electric vehicles is raising serious concerns regarding the sourcing of critical materials such as lithium, cobalt and nickel as reserves, mining production and processing highly concentrated[9] geographically. Depending on the pace of EV adoption across the globe, major supply-side challenges may arise for some of these raw materials. All automakers are striving to secure access to these critical minerals either via long term offtake agreements or via direct sourcing.

The accelerated ramp-up of EV battery capacities has prompted efforts in Europe and the US to reduce dependency on Asia amid increased geopolitical and trade tensions. China is the dominant player in the battery value chain as it produces 79% of all lithium-ion batteries and holds a majority share of worldwide production capacity for key battery components (70% for cathodes and 85% for anodes). Concern over China's dominance has led to the intensification of gigafactory projects and investments in the US – helped by the Biden administration's Inflation Reduction Act subsidies – and Europe to cover future battery demand locally.

Responsible production

The automotive industry needs to support the transition to net-zero across the whole value chain. This involves both sustainable manufacturing processes and sustainable supply chain. While driving their own operations toward more responsible practices, OEMs will have to encourage their suppliers make the necessary investments in sustainable materials and components. Sustainability is becoming a key criterion for awarding contracts to suppliers, thereby favouring products and technologies with minimum environmental impact. This requires increased transparency, leading OEMs to require full disclosure of the various links in the supply chain in awarding new contracts in sensitive areas such as battery-related raw materials. There are, however, challenges due to the complexity of the industry's international supply chains which may hinder the ability to trace the origin of raw materials used in vehicle manufacturing.

OEMs are committed to ensuring that environmental and social standards are respected across the value chains. They are under increased scrutiny about responsible procurement of raw materials, which face the highest risks during the extraction and processing phases. This applies to critical metals used in batteries (lithium, cobalt, nickel, manganese), electric motors (rare earths) and vehicles (aluminium, copper). These critical metals are often associated with geopolitical (overreliance on sensitive regions/countries), geological, environmental (highly polluting extraction and refining), societal and ethical risks.

While lithium is often in the spotlight due to the associated environmental risks and potential supply deficit in the long term, greater focus has been put on cobalt social and ethical risks, mainly in connection with child labour and human right issues in the small-scale mining activity in DRC, which captures the lion's share of global cobalt production (73% in 2022). The industry is looking for alternatives to cobalt to reduce the latter's share in battery cells. Even though cobalt remains a key raw material for batteries thanks to its benefits in terms of safety and stability, we observe a declining share of cobalt-containing chemistries, lower cobalt intensity in nickel-cobalt-manganese (NCM) chemistries and a higher share of cobalt-free lithium-iron-phosphate (LFP) chemistries, notably in China. Outside of China, we note a growing interest in LFP technology, coming from OEMs such as Tesla, Volkswagen AG, Stellantis NV and Ford Motor Co., primarily for entry-level electric vehicles.

Suppliers are required to comply with their due diligence obligations, usually incorporated in contractually binding sustainability standards. This involves, inter alia, protecting human rights, rejecting child labour and forced labour. Besides internal codes of conduct, suppliers must follow external guidelines such as the OECD due diligence guidance for responsible supply chains of minerals from conflict and high-risk areas.

[9] In 2022, according to US Geological Survey, 92% of global lithium production in 2022 came from Australia (47%), Chile (30%) and China (15%). Approximately 81% of cobalt supply came from the Democratic Republic of Congo (73%), Indonesia (5%) and Australia (3%) while cobalt refining was dominated by China (76%) according to Cobalt Institute. Around 66% of nickel production originated from Indonesia (36%), the Philippines (13%), Russia (9%) and New Caledonia (7%) according to USGS.

Several carmakers have joined major mining initiatives aimed at establishing rigorous standards for responsible mining practices, such as the Responsible Minerals Initiative (RMI) and the Initiative for Responsible Mining Assurance (IRMA).

Relevance to our rating approach:

Those companies which proactively adjust their labour structures and allocate the necessary resources to train and reskill their workforce will be best positioned to address the disruption risk facing the traditional automotive workforce, this is part of an active labour management which requires to maintain close and good relations with the unions. This workforce transformation could entail significant upfront costs to avoid higher costs at a later stage. OEMs with higher vertical integration in the EV value chain should be better placed to absorb part of the potential job losses stemming from this workforce transformation.

Failure to monitor direct and indirect suppliers may prevent automotive players from identifying potential risks across the value chain. Good quality relations with suppliers can prevent conflicts and business interruption. Due to the scarcity and geographical concentration of certain key materials, especially those required for battery-electric vehicles, it is crucial for automakers to secure sufficient supply of such metals to meet their fleet electrification targets. The best protected OEMs have the highest share of critical materials secured either via long term offtake agreements and/or via direct sourcing.

Failure to ensure responsible mining for critical materials can result in damaging reputational and litigation risks. Likewise, working with suppliers with poor ESG credentials can lead to reputational risks. Such reputational risks may affect access to capital as well as investors and other stakeholders' trust.

2.4. Regulation, political intervention, reputational risks

Regulation

The automotive industry is one of the most regulated industries in the world. The industry is subject to a wide range of global, regional, national and local regulatory requirements affecting products, manufacturing facilities and workforce. These regulations cover many topics, from vehicle type approval, product safety, fuel efficiency, greenhouse gas and tailpipe emissions, end-of-life management, to site environmental protection and occupational health & safety. Meeting such regulatory requirements has significant financial implications for the industry, as it increases investment needs (capex, R&D) and manufacturing costs.

We expect the magnitude and scope of regulatory requirements to rise noticeably, along with the associated compliance costs. This is particularly applicable to environmental issues, for which the auto industry has been under closer political, regulatory and public scrutiny, notably since the Volkswagen diesel emissions scandal was unveiled in 2015. On climate issues, we expect increased pressure on total GHG footprint reduction (scope-1, -2, -3 emissions) and the introduction of more extensive regulations such as carbon life-cycle assessment (LCA) of vehicles, under consideration within a 2030 timeframe.

Changes in regulatory frameworks may affect market dynamics in various ways. There are prominent examples of how the regulatory framework can influence market demand and the industry's competitive and technological landscape, with both negative and positive implications.

Growth in sales of EVs to date has primarily the result of toughening emissions regulations and governmental financial support. China's current domination in the electric vehicle market is, in our view, the best illustration of the impact that regulation can have on the automotive industry. China has become an EV powerhouse, reaching for the first time in 2022, more than 50% of the worldwide EV population and around 60% of all new electric cars sold globally, following the New Energy Vehicle (NEV) policy officially launched in 2009, complemented by the "Made in China 2025" strategy plan unveiled in 2015.

In many respects, Europe has the most stringent (and complex) regulatory arsenal regarding the automotive industry. This includes CO_2 emissions standards, pollutant emissions standards (currently Euro 6 for light vehicles and Euro VI for commercial vehicles), vehicle test procedures such as WLTP[10] and RDE[11], fuel quality regulation, end of life vehicles regulation, EU batteries regulation, critical material raw materials regulation etc.

As part of the European Green Deal established in 2019 with the ambition to achieve climate neutrality by 2050, the Fit-for-55 regulation[12], was unveiled in July 2021. Following its adoption by the European Council on March 28, 2023, the EU will be the first major region worldwide to enforce a 100% CO_2 emission reduction for both newly registered cars and vans from 2035.

The current CO_2 emission reduction target for 2030-2034 was tightened to 55% for new cars (from 37.5%) and 50% for new vans (from 31%) compared to 2021 levels. These new CO_2 standards will be reviewed in 2026 to analyse their effectiveness and the need to revise these targets in the light of future technological breakthroughs and any significant progress in energy efficiency, price affordability, charging infrastructure or fairness. This decision equates to an effective ban of the sale of ICE-powered cars and vans in the EU from 2035, which will reshape the European competitive landscape in the years ahead.

Air pollution remains a significant environmental challenge for the industry despite greater focus on GHG emissions. As road transport remains the largest source of air pollution in urban areas, regulation continues to tighten and push for cleaner vehicles on the road (e.g. upcoming Euro 7 norms in Europe).

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[10] WLTP (Worldwide Harmonised Light Vehicle Test Procedure) was gradually deployed in the EU between 2017 and 2020 to replace the New European Driving Cycle (NEDC) in place since 1992.

[11] RDE (new real driving emissions test procedure) was introduced in 2018 to complement laboratory-tested measures.

[12] The Fit for 55 package contains a series of policy proposals intended to reduce the EU greenhouse gas emissions by at least 55% in 2030 compared to a 1990 baseline. Besides stricter CO_2 emission reduction targets for new cars and vans, the package includes other measures such as the development of alternative fuels infrastructure, the tightening of the EU emissions trading system (ETS), the implementation of a carbon border adjustment mechanism and a climate social fund.

Any failure to comply with GHG and pollutant emissions standards exposes companies to the risk of significant fines. The EU penalty for excess emissions from light-duty vehicles is EUR95 per gram of CO_2/km above the stated limit. In the US, over the past few years, automakers have paid a significant number of fines for failing to comply with Corporate Average Fuel Economy (CAFE) standards. According to the Alliance for Automotive Innovation, which represents almost all major automakers in the US, the original Biden administration proposal to tighten fuel economy standards through 2032 could have cost the industry more than USD 14bn in non-compliance penalties between 2027 and 2032. The final rule approved in March 2024 is less aggressive but still demanding and expensive to comply with.

Besides non-compliance with emission standards, violations of regulations such as environmental or competition laws may result in costly settlement fines or damage awards with material negative impact on earnings, cash flows and ultimately credit quality. This may also harm a company's reputation and weaken its competition position and access to capital.

The automotive industry has gone through several high-profile legal proceedings and antitrust cases in the past decade. The Volkswagen diesel scandal has cost the German firm more than EUR 32bn in fines, settlements, legal fees, vehicle buybacks, retrofit programs and customer compensation. Cheating on emissions tests turned out to be an industry-wide issue involving many global automakers which were subsequently subject to probes and legal proceeding in various jurisdictions, most of them still pending. This diesel scandal was a turning point, triggering a widespread distrust of diesel technology and greater political and regulatory scrutiny.

Political intervention

The automotive industry is a pillar of the world economy, in terms of global turnover, direct and indirect employment, R&D and investment in innovative technologies. The industry is inevitably vulnerable to political intervention under various forms. Such intervention can impose extra ESG-related costs on the industry but also mitigate them.

In times of crises, government support can involve direct financial support to avoid bankruptcies of national champions as with the USD 80bn emergency funding provided by the Obama administration in 2008-2009 via the Automotive Industry Financing Program (AIFP) to prevent the uncontrolled liquidation of General Motors, Ally Financial (former GM's captive finance subsidiary), Chrysler and Chrysler Financial. The demise of these leading firms would have had a huge adverse impact on the rest of the US auto industry and the overall economy. The auto industry was the only non-financial sector to receive a bailout in the U.S. during the global financial crisis.

Beside direct financial support, governments can be tempted to mitigate a potential volume collapse during recessions, as illustrated by the various scrappage schemes implemented in 2009 ('cash for clunkers' in the US, 'Abwrackprämie' in Germany, 'prime à la casse' in France, 'VIVE' plan in Spain) or tax incentives for vehicle purchases in China in 2009, 2015 and 2022. The flipside of such support schemes is that their positive impact tends to be short-lived as they distort underlying demand, leading to slumps in the following years.

In many instances, the main purpose of political interference is to protect employment even in the absence of direct state ownership in the companies in question. Exit barriers therefore tend to be high in the auto industry, especially among OEMs where plant closures and redundancy plans usually drive significant media attention due to the sector's high social profile.

Other types of political intervention include the use of trade barriers and other measures (e.g., local content requirements) aimed at protecting domestic auto industry as a whole or certain segments. This can be structural or the result of geopolitical tensions as experienced during Donald Trump's mandate, with the tariff war between the US and China. The EU has recently imposed tariffs on imports of EVs from China, saying the Chinese OEMs benefit from hefty state subsidies.

Reputational risks

Automotive companies also face reputational risks, which can have severe consequences for brand perception and possibly affect their business activity as well. This could be caused by quality and safety issues, leading to costly product recalls, maintenance campaigns and higher warranty obligations. This could also be the result of highly publicised trade disputes, private litigations, legal probes and proceedings, or security and data breaches.

Relevance to our rating approach:

We assess to what extent an issuer is exposed to regulatory changes or political intervention and whether it is prepared to address and comply with these changes. We also monitor the issuer's litigation track record, non-compliance issues and exposure to shifts in political landscape. We evaluate the financial risks weighing on the issuer's investment needs, cash generation capability or need to build debt-like provisions or contingent liabilities.

More stringent laws and regulations may have a significant impact on business operations, increase cost of compliance, generate additional liabilities and negatively affect profitability. Likewise, penalties for non-compliance tend to be expensive, as they are designed to create a deterrent effect on industry players.

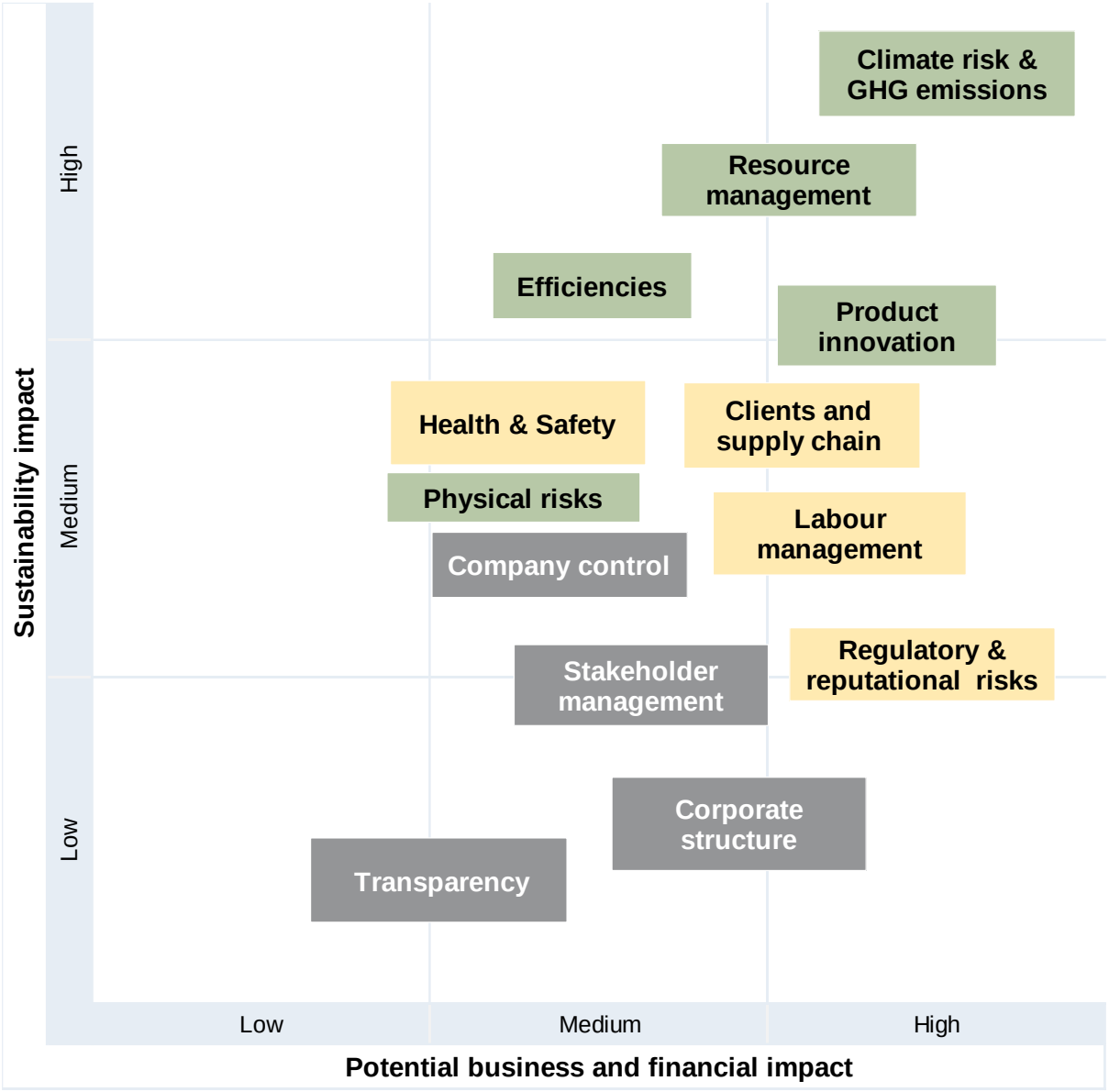
From a rating perspective, government intervention is a double-edged sword. It may create favourable framework conditions that can support industry financing and protect business models. Conversely, it may hinder rational business decisions, or necessary adjustments. On the geopolitical front, any escalation in tariff and other trade barriers between major trading partners across the globe (e.g. US/EU, US/China, EU/China) could negatively impact global economic activity, international flows and potentially reduce demand for motor vehicles, parts and automotive components.

Claims, lawsuits, legal proceedings and enforcement actions may result in penalties, settlement costs or damage awards reflected in significant liabilities and cash outflows, potentially over several years. This may have negative implications for a company's profitability, free cash flow, financial flexibility and refinancing capacity.

Issuers affected by reputational damage may suffer from negative impact on their sales, operations and ability to attract/retain equity and credit investors. Funding ability may be hampered by investors' reluctance to invest in companies involved in controversies and scandals (e.g., 'dieselgate') or scoring poorly on ESG criteria. These adverse impacts may be only temporary, if appropriate corrective measures are implemented promptly or else linger for a longer period.

3. Materiality of the ESG factors on the automotive industry

Our ESG framework includes various broader categories related to environmental, social and governance factors. We differentiate between the impact these factors have on sustainability and on a company's credit profile (business and financial risk). Not all ESG factors influence an issuer's creditworthiness to the same extent.



4. Typical ESG factors in the automotive industry

Governance is generic and applies to all industries. How it is measured is therefore particularly important. The environmental and social factors listed here are meant to provide a realistic reflection of the risks and opportunities that an automotive company might face. The list below is non-exhaustive and expected to evolve over time.

Environment			
	Sub-Indicator	**Measurement/Indicator**	**Credit impact**
Resource management	Air pollution	• Emissions of air pollutants such as nitrogen oxides (NO_x), particulate matter (PM) or carbon monoxide (CO) in vehicle fleets • Air pollutant emissions in production facilities, including sulphur oxides (SO_x) and volatile organic compounds (VOCs)	• For car and truck producers, tightening emission standards mean higher investments and production costs. Industry players may not be able to pass on the entire extra cost to their customers, thus eroding profit margins.
	Greenhouse gas emissions	• Carbon footprint of vehicle fleet, production & logistics and aftersales operations • CO_2 reduction targets (e.g. lifecycle emissions per vehicle) • Carbon neutrality roadmap • Share of low emission/zero emission and CO_2-abating products in production and sales • Pipeline of zero emission (ZEV) vehicles • Share of Capex/R&D earmarked for clean technologies	• Achieving carbon reduction targets requires substantial investments in new technologies, innovative drivetrains, battery capacities and software capabilities. • Despite lower spending on internal combustion engines, this is putting pressure on the industry's free cash flows in the short-term. • Failure to meet assigned regulatory targets can lead to hefty fines and tarnish brand image.
	Consumption of natural resources (water, energy)	• Energy consumption • Energy mix (share of renewable sources, green electricity…) • Trend in natural resources (e.g. water) consumption in the production process • Investments dedicated to wind, solar and other renewable energy sources	• Reduced energy and water consumption supports operating profit improvement. • Reduced risk of operational disturbance.
	Circular economy	• Measures and investments dedicated to improved waste management • Use of recycled and secondary raw materials in component and vehicle production. • % of material recoverability • Measures in place for closed loop circularity (e.g. battery recycling)	• Waste reduction contributes to lower input costs. • Circular economy can save sizeable amounts of raw materials and energy consumption, while expanding product lifespan. • Circular economy can also provide new revenue streams via parts remanufacturing or vehicle reconditioning
Efficiencies	Production process	• Capacity utilisation rate • Plant automation rate • Amounts earmarked for the modernisation/upgrading/digitalisation of manufacturing facilities	• Low-capacity utilisation results in low fixed costs absorption • Older facilities tend to be less efficient and less flexible.
Product innovation	Research and development Technology	• R&D spending as % of revenues • % of digitalisation of operations • Investment in innovative technologies	• Sizeable investments in technology and new products are putting operating margins and free cash flows under pressure. • Maintaining strong innovation capabilities is a key differentiating factor amid dynamic market changes. This can translate into higher pricing power and margins.

Environment			
	Sub-Indicator	**Measurement/Indicator**	**Credit impact**
Physical risks	Workplace hazards Force majeure risks	• Exposure to hazardous substances, noise, vibrations and fire • Risk assessment related to production workstation ergonomics • Usage of manual handling • Usage of load shifting devices • Exposure to extreme weather events and natural disasters such as floods, heavy storms, wildfires or earthquakes	• These risks can have a significant impact on the health, safety and physical integrity of employees, thus deteriorating labour productivity and increasing social expenses for the employer. • Extreme weather-related events or natural disasters may damage production facilities, resulting in supply disruptions, delivery delays, repair expenses and higher insurance premiums.

Social			
	Sub-Indicator	**Measurement/Indicator**	**Credit impact**
Labour management	Workforce metrics	• Staff costs as % of revenues • Productivity ratios • Share of temporary workforce • Age pyramid, natural attrition • Number of work stoppage • Amount of training hours and related expenses • Professional development programs, including re-skilling and up-skilling policies • Talent acquisition and management	• High labour productivity is a clear competitive advantage in a high fixed cost industry. • It is key to ensure that the workforce is ready for the ongoing industry transformation. • The shift towards EVs requires new staff profiles and new business skills along the value chain (including skilled technicians to service and maintain electric vehicles). • The fast ramp-up of electrification and software/digital in the auto industry puts many jobs at risk for both OEMs and suppliers.
	Human rights	• Assessment of potential human rights risks in production and in supply chain (e.g. child labour, forced labour…) • Implementation of protective and remediation measures	• Human rights violation (actual or suspected) can harm a company's reputation and lead to investor/consumer lawsuits or boycott, as well as financial penalties.
	Compensation & social protection	• Average wages and benefits compared with rest of sector • Turnover rate, employee retention programs • Employee/management incentivisation schemes • Employee satisfaction • % of unionised active workforce • Nature and state of relationships with the unions • Frequency and average duration of strikes	• Employer's competitive compensation policies can contribute to its ability to attract and retain talents. • Poor employee satisfaction may deteriorate workforce morale, loyalty and productivity. • In many locations, a high unionisation rate can hinder necessary restructuring. • Poor relations with unions may create disruptions and lead to difficult labour/wage agreement renegotiations as well as frequent strike actions.
	Diversity, inclusion & equal opportunities	• Gender and diversity ratios • Gender and diversity pay gap • Share of women in senior management positions and executive bodies • Employer's commitments on these topics	• Staff diversity and inclusive employment practices help to improve employee engagement and satisfy increasing requests by regulators and ESG-oriented investors. • Transparency on gender/pay gaps and reduction of such gaps can satisfy legislative scrutiny and mandatory reporting requirements.
Health & safety	Product safety	• Number of road accidents related to product safety • Road fatality rates in connection with defective cars, component parts or systems.	• Product-related safety issues, defective parts or systems may result in product liability losses, costly recalls or maintenance campaigns and lawsuits.
	Working conditions	• Measurement and tracking of health and safety-related incidents • Frequency of work-related non-fatal injuries and fatalities • Health-related absenteeism	• Greater attention to health and safety measures should lead to fewer occupational injuries and ensure continuity in business operations (lower absenteeism) • Failure to address these issues or to meet regulatory guidelines may result in strikes, employee lawsuits and fines.

Social			
	Sub-Indicator	**Measurement/Indicator**	**Credit impact**
	Privacy & data security	• Total spending on data protection and cybersecurity • Compliance with international and national data protection laws, such as the General Data Protection Regulation (GDPR) in Europe or the California Consumer Privacy Act.	• An accidental leak of sensitive information can cause financial losses, remediation costs, legal liabilities, loss of reputation, customer trust and stakeholder confidence. • This may affect a company's cash flow directly or indirectly.
Clients and supply chain	Procurement and supply chain management	• Supply chain diversification • Proportion of procurement in single/dual sourcing • Make or buy strategies • Nature and quality of relationship with key suppliers • Accuracy of inventory management • Availability of key components (e.g. semiconductors) and contingent sourcing policies • Identification and management of critical materials • % of critical materials secured either via long term offtake agreements or via direct sourcing	• Supplier diversification is instrumental in maintaining business continuity and avoiding costly shortages. • A close oversight of the various supply chain tiers can help secure sourcing and detect potential issues early. • Few or no disputes with suppliers can prevent damaging business interruption. • Inventory shortage can trigger production disruptions while excess inventories lead to cash absorption. • Due to the scarcity and geographical concentration of certain key materials, especially those required for battery-electric vehicles, it is crucial for automakers to secure sufficient supply of such metals to meet their fleet electrification targets.
	Responsible supply chain	• Percentage of CO_2 neutral production materials • Assessment of sustainability score of suppliers (including labour relations, human rights respect and business ethics) • Involvement in responsible mining (sourcing from certified mines) for cobalt, lithium and other critical minerals • Compliance with OECD recommendations and Responsible Minerals Initiative's reporting standards.	• Working with suppliers with poor ESG scores can lead to reputational risks. • Failure to ensure responsible mining for critical materials can result in damaging reputational and litigation risks.
Regulatory & reputational risk	Regulation	• Track record of compliance with applicable laws and regulations • Amount of litigation costs and liabilities, settlement costs of legal proceedings related to regulatory issues (e.g. fraud, anti-trust…)	• Compliance failures may result in significant fines and weigh on the company's earnings and cash flows. • Regulatory requirements may have significantly negative financial implications, reflected in higher manufacturing costs, capex and R&D spending.
	Reputation	• Media sentiment • Consumer sentiment	• Adverse publicity can harm the company's brand image and affect its relationships with customers, suppliers, investors and other key stakeholders.

Governance			
	Sub-Indicator	**Measurement/Indicator**	**Credit impact**
Company control	Board structure and effectiveness	• Board independence • Competence and diversity of board members • Effectiveness of oversight, risk management and internal control mechanisms • Sustainability targets at board and executive management levels	• Ineffective board or lack of controls can result in poor decision-making and failure to achieve strategic goals. • Tight controls are vital to minimise fraud, theft and the misuse of company resources.
	Risk management	• Risk management framework and culture • Risk-adjusted return/performance measures	• Risk awareness at all levels of an organisation is crucial for effective strategic, operational and financial risk mitigation.
	Bribery and corruption	• Frequency and magnitude of bribery and corruption incidents	• Adverse reputational consequences can lead to regulatory reprimands, fines, the loss of assets and/or the loss of operating licences.
Clarity/ transparency	Financial disclosure	• Timeliness and quality (GAAP) of disclosures • Comprehensiveness of disclosures (e.g. on terms of loan agreements, contingent liabilities, related-party transactions, ownership structure) • Consistency in reporting formats	• Rapid and comprehensive financial reporting instils confidence and signals strong and effective internal controls. • Conversely: slow and incomplete reporting may signal weak controls, incompetence or attempts at concealment (‘creative accounting’).
	Transparency of communication	• Earnings calls and investor presentations that help stakeholders understand the company’s performance drivers and strategic direction • Risk factor (including ESG-related risks) and sensitivity analysis	• Transparency is often associated with strong governance. • Understanding and openness about risk factors allows a company to hedge against risks and prepare mitigation strategies.
Corporate structure	Complexity	• Complex and transparent ownership structure (nominee holdings hiding true owners) • Complex group structure • Complex debt structure • Significant related-party transactions • Aggressive tax optimisation strategies • History of frequent legal or regulatory infractions	• Opaque company ownership, cross holdings, and significant minority interests may hide conflicts of interest. • Complex debt structures can result in unexpected events of default and cross-acceleration. • Related-party transactions can disguise inappropriate diversion of company assets. • Aggressive tax strategies can backfire and result in unexpected tax penalties, negative publicity, and reputational damage.
Stakeholder management	Stakeholder relations	• Respect and balance of interests of all stakeholders	• Stakeholder disputes may have negative reputational and financial consequences.
	Shareholder distributions	• Financial policy clarity, consistency, credibility and track record • Board level endorsement of financial policy	• A clear and credible financial policy helps management meet strategic targets and manage stakeholder expectations.

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