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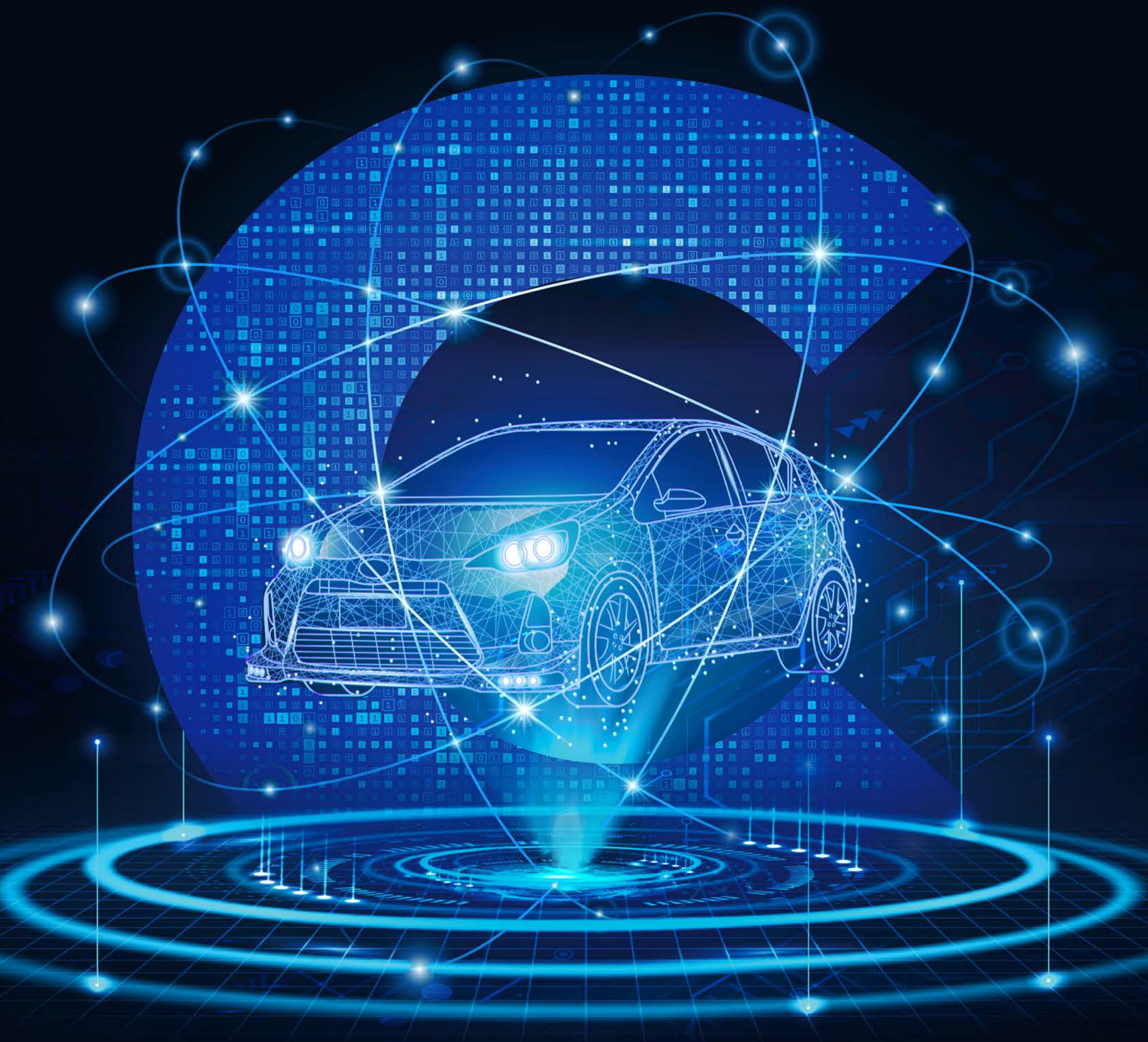

From Words to Data:

Bridging Hyundai’s Climate Commitments and Disclosure

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Solutions for Our Climate (SFOC) is an independent nonprofit organization that works to accelerate global greenhouse gas emissions reduction and energy transition. SFOC leverages research, litigation, community organizing, and strategic communications to deliver practical climate solutions and build movements for change.

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Executive Summary

The global automotive sector is navigating a difficult transition, with automakers balancing market headwinds, regulatory changes, and accelerating investor expectations while pursuing long-term decarbonization. In light of this, Hyundai Motor has taken meaningful steps: committing to carbon neutrality by 2045, pledging full electrification in major markets by 2040, investing KRW 120.5 trillion through 2033, and introducing quantified assessments of certain physical risks as well as transition-policy sensitivities based on IEA scenarios. These efforts signal ambition and progress.

At the same time, Hyundai Motor's disclosures reveal notable gaps compared with global benchmarks. Scope 3 emissions, accounting for the majority of its footprint, are only partially reported, with no supplier-level targets. The company's net-zero pledge is not validated by the Science Based Targets initiative (SBTi), and scenario analyses provide selective estimates but lack comprehensive modeling of profitability, asset resilience, or stranded-asset risk under 1.5 °C and 2 °C pathways. Climate-related lobbying also remains opaque, with no systematic evaluation of whether trade association positions align with Hyundai Motor's stated goals.

Bridging these gaps presents a valuable opportunity for Hyundai Motor to achieve its 2045 carbon neutrality goal. By providing stronger disclosure, Hyundai Motor can strengthen investor confidence, secure access to green finance, and remain competitive in markets moving rapidly toward stricter climate standards, such as the EU CSRD, ISSB, and CBAM. Transparency on capital allocation, supplier engagement, and lobbying alignment would position the company ahead of regulatory curves and reinforce its credibility with global stakeholders.

This report therefore recommends Hyundai Motor:

- Seek SBTi validation of its targets and introduce interim milestones
- Expand Scope 3 disclosure to material and supplier levels, with measurable reduction strategies
- Integrate quantitative scenario analysis linking risks and opportunities to financial outcomes
- Enhance transparency in industry lobbying and stakeholder engagement

I Background

The global automotive industry is undergoing a profound transformation. Automakers are navigating rising material and supply-chain costs, policy uncertainty across key markets, and slowing demand in some regions. At the same time, regulations, such as the EU Corporate Sustainability Reporting Directive (CSRD), ISSB climate standards, and the EU Carbon Border Adjustment Mechanism (CBAM), are raising disclosure and compliance expectations to levels comparable with financial reporting.

Given this context, climate strategy is no longer optional. Companies now need credible transition plans and transparent disclosure to maintain investor confidence, meet regulatory requirements, and stay competitive in the long term. European peers, such as BMW and Renault, have demonstrated early leadership through SBTi-validated targets, detailed Scope 3 reporting, and scenario analysis linked to financial outcomes.

Hyundai Motor has also made important commitments. The company has pledged carbon neutrality by 2045, aims for full electrification in major markets by 2040, and announced KRW 120.5 trillion in investments through 2033 in electrification, software, and sustainability. It has begun quantifying certain physical risks (e.g., facility exposure under IPCC climate pathways) and selected transition-policy sensitivities (e.g., projected CBAM costs). These steps mark progress, yet significant gaps remain in areas such as Scope 3 coverage, scenario-based financial analysis, and climate lobbying transparency.

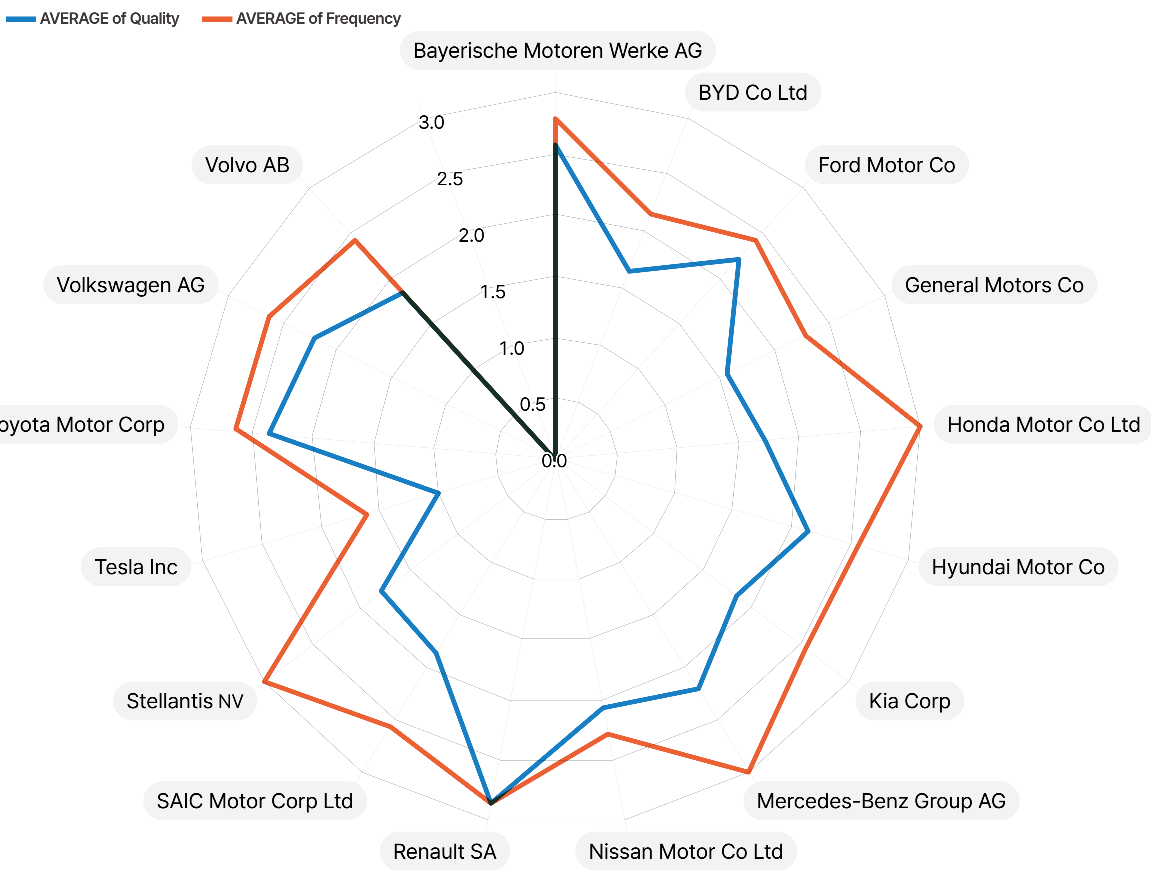
This report benchmarks Hyundai Motor among 16 global automakers to assess where it stands in disclosure maturity, highlight gaps relative to best practice, and outline practical recommendations for strengthening its credibility with investors and alignment with emerging global standards[1].

1 The assessment is grounded in internationally recognized standards and initiatives, including the Task Force on Climate-related Financial Disclosures (TCFD), the Carbon Disclosure Project (CDP), the Science-Based Targets initiative (SBTi), the Assessing Low-Carbon Transition (ACT) framework, and emerging requirements under the International Sustainability Standards Board (ISSB) and the European Union (EU) Corporate Sustainability Reporting Directive (CSRD). Using 15 disclosure indicators across five core pillars (Governance & Strategy, Targets & Emissions, Transition Plans & Investment, Reporting & Transparency, Policy & Stakeholder engagement, and Timeliness of Updates), this report provides a structured, data-driven evaluation of disclosure maturity and credibility.

II Benchmark Results and Analysis

The assessment of the climate-related disclosures of 16 major global automakers identified three tiers of disclosure performance: Transparency Leaders, Moderate Performers, and Underperformers. These tiers reflect each company's aggregated performance based on two dimensions: ① disclosure quality, measured by comprehensiveness and adherence to 14 key indicators, and ② reporting frequency, which captures how regularly disclosures are updated. Transparency Leaders consistently exhibit strong performance in both dimensions, signaling robust climate accountability practices. Moderate Performers demonstrate partial alignment with disclosure standards, and Underperformers display significant gaps in transparency and the regularity of updates.

[Figure 1] Climate Disclosure: Quality and Frequency **Source**: Empower, Solutions for Our Climate (SFOC)



[Figure 2] Climate Disclosure: Score by Indicator and Automaker

Source: Empower, Solutions for Our Climate (SFOC)

Indicator		Bayerische Motoren Werke AG	BYD Co Ltd	Ford Motor Co	General Motors Co	Honda Motor Co Ltd	Hyundai Motor Co	Kia Corp	Mercedes-Benz Group AG	Nissan Motor Co Ltd	Renault SA	SAIC Motor Corp Ltd	Stellantis NV	Tesla Inc	Toyota Motor Corp	Volkswagen AG	Volvo AB
Governance & Strategy	Climate scenario analysis	3	1	3	1	3	2	1	3	2	3	1	2	0	3	3	1
	Climate/ESG Committee	3	1	3	1	2	2	3	3	2	3	2	2	0	2	3	2
	Long-term climate strategy	3	2	2	2	2	3	2	2	2	3	2	2	2	3	2	2
	Net-zero target alignment	3	1	2	2	1	2	2	3	2	3	2	1	1	3	3	2
Targets & Emissions	Scope coverage (1/2/3)	3	2	2	2	2	3	2	3	3	3	3	2	1	3	3	3
	GHG reduction targets	3	2	2	1	1	2	1	2	3	3	2	2	1	3	3	2
	ACT ratings	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Transition Plans & Investment	Detail Level	2	2	2	1	2	3	2	2	2	2	2	1	2	2	2	2
	Disclosure Type	3	2	3	2	1	3	2	2	2	3	2	2	2	2	2	2
Reporting & Transparency	Audited third-party verified	3	1	2	3	2	2	3	2	2	3	1	2	0	3	2	1
	Accessibility & transparency	3	3	3	2	2	2	2	3	3	3	3	2	2	3	2	3
	Reporting Frequency	3	3	3	2	3	3	3	3	3	3	3	3	3	3	2	3
Policy & Stakeholder engagement	Climate lobbying disclosure	2	1	2	1	1	1	1	1	1	2	1	2	0	1	2	1
	Stakeholder engagement	2	2	2	2	2	2	2	2	2	3	2	2	0	2	2	2

Automaker

1 Transparency Leaders

▪ Renault SA

Renault demonstrates relatively mature climate disclosure. Its 2024 Climate Report is structured around the four TCFD pillars and cross-referenced accordingly, and the company has had its decarbonization targets validated by the SBTi since 2019. Renault integrates the GRI Standards as part of its Extra-Financial Performance Declaration methodology, alongside other international frameworks. The company reports a full Scope 1–3 footprint, with methodological details such as updated assumptions for vehicle use-phase emissions and has obtained third-party assurance for selected environmental indicators. Renault's climate reporting also includes scenario analysis describing transition and physical risks, though external assessments note that the quantitative expression of outcomes could be further strengthened. In addition, Renault was among the European automakers involved in the development of the ACT automotive methodology (v2.0), contributing to the sector's alignment with a 1.5 °C pathway.

▪ Bayerische Motoren Werke AG (BMW)

BMW shows strong alignment with major disclosure standards. It reports Scope 1–3 emissions under ESRS, with its non-financial statement externally assured (limited assurance, and some KPIs at reasonable assurance). The company also discloses a TCFD-style climate scenario analysis including a 1.5 °C pathway and outlines board-level oversight of climate topics. Annual data are updated in the Group report and CDP submissions. However, BMW has not yet quantified the expected financial impacts of climate risks and opportunities under ESRS E1-9,[2] and third-party reviews highlight limited transparency on trade-association alignment and follow-up actions. Greater disclosures in these areas would bring BMW closer to investor best practice.

2 Disclosure Requirement E1-9 refers to anticipated financial effects from material physical and transition risks and potential climate-related opportunities.

2 Moderate Performers

▪ Toyota Motor Corp.

Toyota provides TCFD-aligned climate disclosures, including an analysis using the 1.5 °C and 4 °C temperature scenarios and a description of how it evaluated financial impacts. The company also reports SBTi-validated targets; Scope 1–2 at 1.5 °C; Scope 3 Category 11 at "well below 2 °C". It publishes Scope 3 category totals and regional averages for use-phase CO_2 and details on end-of-life/ battery recycling initiatives. Assurance is provided for selected environmental metrics. On policy engagement, Toyota has begun publishing a Climate Public Policies report and says it evaluates its industry associations, though external assessments (e.g., LobbyMap) still question the alignment of its lobbying practices with Paris-consistent pathways. Remaining gaps include the absence of limited supplier- or material-level disclosure for upstream Scope 3.

▪ Volkswagen AG

The Group states its strategy is aligned with the Paris Agreement and has SBTi-validated 2030 targets (–50.4% Scope 1–2; –30% Scope 3 use-phase), but it does not present an SBTi-validated net-zero target. It discloses Scope 1–2 and 13/15 Scope 3 categories, and its sustainability disclosures (including GHG data) receive limited assurance from KPMG. International Energy Agency (IEA) scenarios inform the strategy, and the report includes resilience analyses, but it does not show scenario-specific quantified financial impacts. Emissions accounting is detailed and assured, and the company describes risk management and internal controls over sustainability reporting. Areas that appear less developed in the annual report include factory-level transition roadmaps and supplier-level Scope 3 disclosures.

▪ Ford Motor Co.

Ford has SBTi-approved interim 2035 targets (–76% Scope 1–2 from 2017; –50% per-km Scope 3 use-phase from 2019) and conducts TCFD-aligned scenario analysis using IEA pathways. Its risk disclosures and scenario analyses are largely qualitative — describing revenue or production impacts without quantification — which limits decision-usefulness. Ford discloses fleet-average and regional emissions data and progress against targets but does not provide per-model emissions or supplier-lever Scope 3 details. The company states that its SBTi targets exclude offsets, reserving removals only for any residuals at net-zero. It also acknowledges that the 1.5 °C pathway for the vehicle sector has not yet been finalized by SBTi.[3]

3 Underperformers

▪ SAIC Motor Corp Ltd.

SAIC aligns its climate disclosures with China's "Dual-Carbon" goals,[4] publishing Scope 1–3 emissions under the GHG Protocol and setting intensity-based targets for 2030 and 2035. It has not yet obtained SBTi validation, and its GHG data received limited third-party checks. Oversight lies with the Board's Strategic and ESG & Sustainability Committee, though no climate competency mapping is disclosed. The company provides quantitative Key Performance Indicators (KPIs) such as renewable energy-use and holds annual stakeholder forums, but supplier engagement details remain limited. Other notable gaps include the absence of site-level decarbonization roadmaps, reliance on qualitative (non-financial) scenario analysis, minimal supply chain transparency, and no public review of trade association alignment, as external assessments highlight. Strengths include consistent annual ESG reporting since 2020, supplemented with downloadable data packs.

In general, European automakers (BMW, Renault) lead in disclosure quality, likely driven by stricter EU regulations. Despite its relatively high score, Mercedes-Benz Group AG underperforms compared to peers, such as BMW, revealing internal disparities even among Transparency Leaders. Asian automakers (Toyota, Honda) demonstrate moderate disclosure quality but update their disclosures more frequently. Meanwhile, Chinese firms (SAIC, BYD) trail significantly in both quality and frequency. U.S. automakers show more variations, reflecting regulatory uncertainty and inconsistent regional disclosure requirements.

3 Qualitative-only disclosure is considered insufficient since it prevents investors, regulators, and stakeholders from accurately assessing the magnitude of climate risks and opportunities. Best practice — as expected by frameworks like TCFD and ESRS — involves quantifying financial impacts, which allows for clearer comparability, risk modeling, and integration into financial decision-making.

4 China's Dual Carbon Goals refers to its announcement of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060.

III Hyundai Motor's Climate Disclosures

Hyundai Motor Company (HMC) (KRX:005380) is a flagship automotive manufacturer of the Hyundai Motor Group conglomerate, headquartered in Seoul, South Korea. Founded in 1967, Hyundai Motor has grown into a global automaker operating in over 200 countries, supported by a network of manufacturing plants, regional subsidiaries, and R&D centers. It is a publicly listed company with 2024 revenue of approximately KRW 175.2 trillion and annual sales of 4.1 million vehicles. Hyundai Motor Group's ecosystem includes major affiliates such as Kia Corporation (with HMC holding approximately 35% ownership), Hyundai Mobis (auto parts and technology), and financial services arms such as Hyundai Capital. This integrated structure enables group-wide strategies in mobility and electrification, though each brand maintains separate operations and reporting. HMC's Sustainability Management Committee under the Board of Directors oversees ESG strategies and risks. It emphasizes diversity and includes climate oversight as part of its mandate. Notably, José Muñoz — appointed as global President and CEO effective January 2025 — has publicly reinforced Hyundai Motor's commitment to "advancing emissions-free mobility" under the company's "Progress for Humanity" vision. Under his leadership, HMC's strategic direction increasingly intertwines financial performance with sustainability objectives.

1 Sustainability Disclosure Performance

Hyundai Motor has strengthened its sustainability reporting by aligning the 2025 Sustainability Report with TCFD, SASB, and ESRS guidance, publishing dedicated indices and introducing quantified physical-risk scenario outputs, such as revenue and asset-loss ranges. The company has also pledged carbon neutrality by 2045, set electrification goals of 100% sales in Europe by 2035 and in major markets by 2040, and announced a KRW 120.5 trillion investment plan through 2033. These steps reflect top-line ambition and growing integration of climate considerations into corporate strategy.

However, significant gaps remain. Scope 3 reporting is only partial and lacks material- or supplier-level detail, and Hyundai Motor's net-zero pledge has yet to be validated by SBTi. Assurance is primarily limited to domestic Scope 1–2 data, and methodological transparency on baselines and scenario assumptions is insufficient. As a result, despite extensive references to frameworks such as GRI, CDP, and UNGC, some elements of Hyundai Motor's disclosures remain below the level of transparency and assurance anticipated under ISSB/ESRS standards.

2 Investor Expectation Gap

Hyundai Motor has set interim reduction targets for Scope 1–2 and downstream Scope 3 use-phase emissions and has outlined supply-chain waypoints in earlier reports. However, the 2025 report provides fewer 2030 checkpoints, adjusts certain base years, and does not clarify the role of offsets in achieving the 2045 goal. This creates uncertainty for investors seeking near-term milestones and robust methodologies. External benchmarks, such as the ACT assessment, highlight these gaps, noting Hyundai Motor's implied trajectory remains above Paris alignment.

Beyond targets, investors also focus on capital allocation and transition planning. Hyundai Motor's BEV sales remain in the single-digit share of total volumes, lagging behind peers like BMW and Volkswagen. Its KRW 120.5 trillion investment plan is significant but does not disclose the split between EV and ICE programs, limiting visibility into whether capital is aligned with transition goals. Similarly, while Hyundai Motor's reports quantify certain risks, such as projected CBAM costs, they do not present integrated transition scenarios linking financial outcomes, stranded-asset exposure, or profitability under different policy pathways.

3 Scenario and Risk Analysis Gap

Hyundai Motor has made progress by quantifying physical climate risks under different climate pathways (SSP1-2.6 and SSP5-8.5)[5], including potential facility losses of up to KRW 1.2 trillion by 2050, and by estimating transition-related costs from carbon regulations. It has also highlighted revenue opportunities under accelerated EV adoption scenarios, showing an effort to embed scenario analysis into reporting.

Nonetheless, its scenario disclosures remain less granular than those of peers, which link assumptions directly to cash flow, profit, or site-level resilience. Hyundai Motor's analysis often presents aggregate ranges without detailed sensitivities for profitability, asset utilization, or stranded-asset risks. Physical-risk disclosures are largely qualitative, focusing on descriptive categories rather than quantified financial impacts, and transition-risk assessments do not extend to after-sales or ICE legacy operations. Opportunities, such as EV and hydrogen growth, are mentioned but lack forecasts for revenue or profitability. As a result, Hyundai Motor recognizes key categories but does not provide the quantitative detail necessary for investors to properly evaluate its resilience.

5 Shared Socioeconomic Pathways (SSPs) refer to scenarios used to describe possible future development pathways in relation to its use of fossil fuels and the social and economic factors which drive fossil fuel use.

4 Market Trends and Regulatory Shifts

Automakers face a rapidly stringent regulatory environment. ISSB climate standards, the EU CSRD, and the EU Battery Regulation are converging toward mandatory and comparable disclosures. For Hyundai Motor, this means high-level commitments will increasingly need to be backed by verifiable data, such as lifecycle carbon footprints for EV batteries, supply-chain due diligence, and transparent treatment of offsets. In addition, new EU measures, such as the Empowering Consumers for the Green Transition (ECGT) Directive, will restrict unsubstantiated marketing claims, reinforcing the need for robust data.

At the same time, competitive and stakeholder pressures are intensifying. Peers, such as Mercedes-Benz, are publishing SBTi-validated transition plans, while Tesla continues to provide detailed supply-chain disclosure. Litigation and lobbying scrutiny are also growing, as investors expect systematic evaluation of industry associations' policy positions and their alignment with stated climate goals. Hyundai Motor's single-digit BEV share underlines the need to accelerate its transition in order to remain competitive. Together, these dynamics highlight both risks and opportunities: companies that strengthen transparency and disclosure are better positioned to secure investor trust, meet regulatory expectations, and compete in the next phase of automotive decarbonization.

IV Hyundai Motor's Climate Risks

Hyundai Motor faces material climate-related risks from the uneven EV deployment and policy alignment across regions. The company has pledged full electrification in Europe by 2035 and in major markets by 2040, and targets 2 million EV sales by 2030 alongside a KRW 120.5 trillion investment plan through 2033 for electrification, software, and sustainability initiatives. These commitments are clear, but execution risk remains where large markets, such as India and Southeast Asia, are electrifying more slowly, prolonging reliance on ICE sales amid tightening rules in the U.S. and EU (e.g., EU 2035 phase-out of new ICE cars; California's ACC II to 100% ZEV sales by 2035).

A key concern is the credibility of Hyundai Motor's net-zero pledge. Hyundai Motor's 2045 target references SBTi guidance but is not validated, and its reporting discusses offsets without clarifying their contribution. In the EU, substantiation of environmental claims is tightening (the proposed Green Claims Directive has been paused, but enforcement against misleading claims is increasing), while due-diligence obligations are expanding via Germany's Supply Chain Act and the EU Corporate Sustainability Due Diligence Directive (CSDDD). Together, these frameworks raise expectations for Paris-aligned transition plans and verifiable data across supply chains.

From an investor standpoint, assessments, such as the World Benchmarking Alliance's ACT rating (5.7C=), point to weak alignment, raising the risk of exclusion from climate-focused portfolios. Stewardship initiatives, including LGIM's Climate Impact Pledge, already link engagement outcomes to sanctions or divestment. Limited progress on Scope 3 reduction and reliance on offsets could therefore narrow Hyundai Motor's access to climate-conscious capital, particularly at a time when peers accelerate their efforts.

Capital markets represent both a risk and an opportunity. Automakers with credible strategies are tapping green bonds and sustainability-linked loans at scale, while Hyundai Motor faces significant investment requirements for EV and hydrogen expansion. Without third-party validation and stronger disclosure, its financing terms may be less favorable. Conversely, enhanced transparency could broaden investor support and lower its cost of capital.

Finally, product mix and policy engagement create governance risks. Hyundai Motor remains heavily ICE-dependent, yet markets, such as the EU and California, are mandating 100% zero-emission sales by 2035. Although the company discloses milestones toward 2 million EVs by 2030, it lacks a clear roadmap for phasing down ICE assets, including conversion costs and potential write-downs. In addition, Hyundai Motor's membership in Korea Automobile & Mobility Association (KAMA), an association that has opposed stronger standards, and mixed signals in domestic lobbying raise questions about consistency between stated goals and advocacy. Investors increasingly expect transparent alignment reviews under frameworks such as Climate Action 100+(CA100+).

To summarize, Hyundai Motor's climate risks are multifaceted: regulatory and compliance exposure, litigation potential, financing and market-access challenges, and reputational risks if perceived as lagging peers. While the company has expanded scenario and risk analysis, strengthening transparency on targets, capital alignment, and lobbying remains essential to reassure investors and maintain competitiveness in a decarbonizing global market.

V Recommendations for Hyundai Motor

Hyundai Motor has made notable progress, and can build on this momentum in strengthening its leadership by focusing on four practical measures:

- **Seek SBTi validation with clear interim milestones**
  Validating Hyundai Motor's 2045 net-zero target through the SBTi would position the company alongside its leading peers. Introducing transparent 2030 milestones across Scope 1-3 would demonstrate credibility and provide investors with meaningful checkpoints for decision-making.

- **Expand Scope 3 disclosure with measurable supplier strategies**
  Scope 3 emissions account for the majority of Hyundai Motor's footprint. Breaking down Category 1 emissions by key materials such as steel, aluminum, and batteries, and publishing supplier-level targets, would meet investor expectations for value chain decarbonization. This would also prepare Hyundai Motor for compliance with the EU Battery Regulation and related supply-chain disclosure laws.

- **Integrate quantitative scenario analysis into financial planning**
  Moving beyond qualitative descriptions, Hyundai Motor should disclose the financial implications of different climate scenarios, including profitability, asset resilience, and stranded-asset risk under 1.5 °C and >3 °C pathways. Such analysis would align with ISSB and TCFD expectations and allow investors to better assess resilience.

- **Enhance transparency on lobbying and stakeholder engagement**
  Publishing an annual climate lobbying report that evaluates the alignment of trade association positions with Hyundai Motor's climate goals would address investor concerns about policy consistency. Establishing a formal Climate Advisory Panel could also strengthen dialogue and demonstrate proactive engagement with key stakeholders.

VI Conclusion

Hyundai Motor has taken meaningful steps toward its 2045 carbon neutrality ambition, from setting long-term electrification targets to expanding sustainability reporting and introducing initial scenario analyses. These advances signal commitment, but they also highlight the scale of the challenge ahead. There is no single blueprint for transition; each automaker must adapt under different market, policy, and technological pressures.

What is clear is that stronger disclosure is no longer optional, but a business imperative. Investors increasingly require actionable, assured data to allocate capital. At the same time, regulators are converging on ISSB-aligned standards and markets, such as the EU, are raising entry thresholds through measures like the CSRD and CBAM. Bridging the current gaps in Scope 3 coverage, SBTi validation, scenario-based financial analysis, and policy alignment would not only reduce risk but also create tangible opportunities: greater access to green finance, stronger eligibility for climate-aligned portfolios, and enhanced competitiveness in global markets.

By moving from high-level commitments to transparent, investor-grade data and credible roadmaps, Hyundai Motor can build greater trust with stakeholders and position itself as a leader in the next phase of automotive decarbonization.

Appendix: Methodology

The benchmarking analysis applied a hybrid approach combining standardized indicators with qualitative review. The goal was to ensure rigor, comparability across peers, and contextual depth for Hyundai Motor.

The scope covers 16 global automakers operating in the EU, the US, Japan, China, South Korea, and others. We recognized comparability challenges due to differences in disclosure maturity, regulatory context, and corporate structure. To address this, a flexible peer comparison was applied, adjusting the comparator group where appropriate (e.g., companies with similar operations, regional exposure, or reporting practices).

At the core of this analysis is a matrix of fifteen indicators informed by leading standards and investor expectations. These draw on frameworks such as TCFD, CDP, SBTi, ACT, GRI, SASB, ISSB (IFRS S1 and S2), ESRS, and guidance from CA100+, the UN Principles for Responsible Investment (PRI), and the Institutional Investors Group on Climate Change (IIGCC). 14 indicators were grouped into five thematic categories: ① Governance & Strategy, ② Emissions & Targets, ③ Transition Planning & Investment, ④ Reporting & Transparency, and ⑤ Policy & Engagement. The last indicator was the ⑥ 'Timeliness of Updates' showing the frequency of each company's updates. The selection reflects both regulatory requirements and investor norms across jurisdictions.

Each indicator was scored on two dimensions — quality and frequency — each on 0-3 scale. Quality measured the robustness of disclosure: 3 for strong, audited, detailed disclosure, 2 for full but limited quality, 1 for partial or weak, and 0 for none. Frequency assessed how often disclosures were updated by automakers: 3 for annual, 2 for biennial, 1 for outdated, and 0 for absent. References to verification mechanisms — such as CDP scoring systems, SBTi dashboards, and ACT assessments — informed both dimensions.

Appendix: Methodology

Scores were derived through manual review of sustainability reports, TCFD/CDP disclosures, investor presentations, and regulatory filings (10-K, 20-F, Form SDs, etc.). Attention was given to update frequency, clarity of language, and presence of third-party assurance.

The matrix served both diagnostic and comparative purposes. It identified gaps and highlighted peer best practices. This allowed benchmarking against regulatory and investor expectations while pointing areas for improvement.

This multi-tiered framework — indicator-based benchmarking, documentary analysis, and regulatory alignment review — supports a robust assessment of not only whether companies disclose, but also the extent to which these disclosures align with credible, investor-grade transition planning.

References

Accounting for Sustainability. (2021). *A4S TCFD Scenario Guide*.
https://www.accountingforsustainability.org/content/dam/a4s/corporate/home/KnowledgeHub/Guide-pdf/A4S%20Guide%20to%20TCFD%20Climate%20Scenario%20Analysis.pdf.downloadasset.pdf

Autotrader. (2025). *UK's new Electric Car Grant and Science-Based Targets explained*.
https://www.autotrader.co.uk/content/news/uk-new-electric-car-grant-and-science-based-targets-explained?refresh=true

BBVA. (2024). *BBVA advised Hyundai Capital Services on its first overseas green loan*.
https://www.bbvacib.com/insights/news/bbva-advised-hyundai-capital-services-on-its-first-overseas-green-loan/

BMW Group. (2024). *A successful 2023: BMW Group posts record sales, meets ambitious e-mobility growth targets*.
https://www.press.bmwgroup.com/global/article/detail/T0438999EN/a-successful-2023%3A-bmw-group-posts-record-sales%20meets-ambitious-e-mobility-growth-targets?language=en

BMW Group. (2025). *ESG Overview 2024*.
https://www.bmwgroup.com/content/dam/grpw/websites/bmwgroup_com/ir/downloads/en/2025/bericht/ESG_Overview_FY-2024.pdf

BMW Group. (2025). *Group Report 2024*.
https://www.bmwgroup.com/en/report/2024/downloads/BMW-Group-Report-2024-en.pdf

BMW Group. (2025). *Key Metrics 2024*.
https://www.bmwgroup.com/content/dam/grpw/websites/bmwgroup_com/ir/downloads/en/2025/bericht/BMW-Group-Key-Metrics-2024.xlsx

BYD. (2025). *2024 BYD Sustainability Report*.
https://www.bydglobal.com/sitesresources/common/tools/generic/web/viewer.html?file=%2Fsites%2FSatellite%2FBYD%20PDF%20Viewer%3Fblobcol%3Durldata%26blobheader%3Dapplication%252Fpdf%26blobkey%3Did%26blobtable%3DMungoBlobs%26blobwhere%3D1638928504148%26ssbinary%3Dtrue

CARB. (2022). *CARB ACC II ISOR (Initial Statement of Reasons)*.
https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf

References

CARB. *Advanced Clean Cars II.*
https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii

CARL. (2020). *2018-2019 Responsible Cobalt Supply Chain Progress Report.*
https://www.catl.com/en/uploads/1/file/public/202009/20200915153709_8hp2572660.pdf

CDP. (2022). *ACT Pilot Executive Summary Report.*
https://actinitiative.org/wp-content/uploads/pdf/cdp_act-executive-summary-220317.pdf

Christian Kontz. (2025). *Do ESG Investors Care About Carbon Emissions?*
https://www.christiankontz.com/files/Kontz_ESG_auto_ABS.pdf

Climate Action 100+. (2020). *2020 Progress Report.*
https://www.climateaction100.org/wp-content/uploads/2020/12/CA100-Progress-Report.pdf

Climate Action 100+. (2021). *Climate Action 100+ Net Zero Company Benchmark v1.1.*
https://www.climateaction100.org/wp-content/uploads/2021/10/Climate-Action-100-v1.1-Benchmark-Indicators-Oct21.pdf

Climate Action 100+. *Ford Motor Company.*
https://www.climateaction100.org/company/ford-motor-company/

Climate Action 100+. *Net Zero Company Benchmark.*
https://www.climateaction100.org/net-zero-company-benchmark/

Crédit Agricole CIB. (2023). *Crédit Agricole CIB acted as Joint Bookrunner & Sole Sustainability Agent on Hyundai Capital America's Inaugural Green Bond.*
https://www.ca-cib.com/en/news/credit-agricole-cib-acted-joint-bookrunner-sole-sustainability-agent-hyundai-capital-americas

Crowell & Morning LLP. (2024). *The Green Claims Directive.*
https://www.crowell.com/en/insights/client-alerts/the-green-claims-directive

Debevoise & Plimpton LLP. (2025). *Increasing Global Adoption of ISSB Standards.*
https://www.debevoise.com/insights/publications/2025/02/increasing-global-adoption-of-issb-standards

Deloitte. (2025). *Adoption of IFRS Sustainability Disclosure Standards by jurisdiction.*
https://www.iasplus.com/en/publications/global/special-topics/sustainability/issb-adoption-tracker

References

European Commission. (2024). *Green Claims.*
https://environment.ec.europa.eu/topics/circular-economy/green-claims_en

European Commission. *Corporate Sustainability Due Diligence.*
https://commission.europa.eu/business-economy-euro/doing-business-eu/sustainability-due-diligence-responsible-business/corporate-sustainability-due-diligence_en

European Commission. *Corporate sustainability reporting.*
https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en#related-links

European Parliament. (2016). *Lawsuits triggered by the Volkswagen emissions case.*
https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/583793/EPRS_BRI(2016)583793_EN.pdf

European Parliament. (2022). *EU ban on the sale of new petrol and diesel cars from 2035 explained.*
https://www.europarl.europa.eu/topics/en/article/20221019STO44572/eu-ban-on-sale-of-new-petrol-and-diesel-cars-from-2035-explained

European Union. (2023). *EU Battery Regulation (Regulation 2023/1542), Article 7.*
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32023R1542&

Federal Ministry for Economic Cooperation and Development. (2023). *The German Act on Corporate Due Diligence Obligations in Supply Chains.*
https://www.bmz.de/resource/blob/154774/lieferkettengesetz-faktenpapier-partnerlaender-eng-bf.pdf

Financial Times. (2024). *Bar is rising for companies' disclosure of climate risk information*.
https://www.ft.com/content/45fa4acd-e861-452b-82e7-b2e66b7c271d

Ford Motor Co. (2023). *2023 Climate Change Report.*
https://corporate.ford.com/content/dam/corporate/us/en-us/documents/reports/2023-climate-change-report.pdf

Ford Motor Co. (2023). *CDP Climate Report*.
https://corporate.ford.com/content/dam/corporate/us/en-us/documents/reports/ford-cdp-climate-report.pdf

Ford Motor Co. (2023). *Ford TCFD Report 2022.*
https://corporate.ford.com/content/dam/corporate/us/en-us/documents/reports/tcfd-report.pdf

References

Ford Motor Co. (2024). *Ford U.S. Sales Rise 7.1% to Nearly 2 Million Vehicles in 2023.*
https://www.fromtheroad.ford.com/us/en/articles/2024/ford-u-s--sales-rise-7-1--to-nearly-2-million-vehicles-in-2023

Ford Motor Co. (2024). *2023 U.S. Political Engagement Report.*
https://corporate.ford.com/content/dam/corporate/us/en-us/documents/reports/Political-Disclosure-Report-2023.pdf

Ford Motor Co. (2025). *Integrated Sustainability and Financial Report 2024.*
https://corporate.ford.com/content/dam/corporate/us/en-us/documents/reports/2024-integrated-sustainability-and-financial-report.pdf

General Motors. (2024). *Data Center.*
https://www.gm.com/content/dam/company/docs/us/en/gmcom/company/GM_ESG_Data_2023.pdf

Greenpeace. (2025). *Driving Backward: How Hyundai Has Left Emerging Markets Behind.*
https://www.greenpeace.org/static/planet4-korea-stateless/2025/01/058997e9-gpea_driving-backwardeng_finallow-definition.pdf

Greenpeace. (2025). *Hyundai's Rising Emissions In Key Markets Like India Risks Fueling Climate Disaster.*
https://www.greenpeace.org/eastasia/press/8761/hyundais-rising-emissions-in-key-markets-like-india-risks-fueling-climate-disaster/

Hogan Lovells. (2025). *On Hold: EU pulls the plug on Green Claims Directive.*
https://www.hoganlovells.com/en/publications/on-hold-eu-pulls-the-plug-on-green-claims-directive

Human Rights Watch. (2024). *South Korea's Climate Law Ruling a Win for Human Rights, New Carbon* Reduction Legislation Needed to Ensure Targets are Met.
https://www.hrw.org/news/2024/09/09/south-koreas-climate-law-ruling-win-human-rights

Hyundai Motor Company. (2020). *Environmental Management Policy.*
https://www.hyundai.com/content/dam/hyundai/ww/en/images/company/sustainability/about-sustainability/policy/hmc-2022-policy-environmental-management-policy-eng.pdf

Hyundai Motor Company. (2024). *2024 Sustainability Report.*
https://www.hyundai.com/worldwide/en/company/sustainability/sustainability-report

References

Hyundai Motor Company. (2024). *Hyundai Motor Announces 2023 Q4 Business Results.* https://www.hyundai.com/worldwide/en/newsroom/detail/hyundai-motor-announces-2023-q4-business-results-0000000405

Hyundai Motor Company. (2024). *Hyundai Motor Reveals Vision for Hydrogen Energy and Software Solutions Beyond Mobility at CES 2024.* https://www.hyundai.com/worldwide/en/newsroom/detail/hyundai-motor-reveals-vision-for-hydrogen-energy-and-software-solutions-beyond-mobility-at-ces-2024-0000000394

Hyundai Motor Company. (2024). *Hyundai Motor Unveils New 'Hyundai Way' Strategy and Outlines Mid- to Long-Term Goals at 2024 CEO Investor Day.* https://www.hyundai.com/worldwide/en/newsroom/detail/hyundai-motor-unveils-new-%25E2%2580%2598hyundai-way%25E2%2580%2599-strategy-and-outlines-mid-to-long-term-goals-at-2024-ceo-investor-day-0000000817

Hyundai Motor Company. (2025). *2025 Sustainability Report.* https://www.hyundai.com/worldwide/en/company/sustainability/sustainability-report

Hyundai Motor Company. *Sustainability Report.* https://www.hyundai.com/worldwide/en/company/sustainability/sustainability-report

I4CE. (2024). *From Stranded Assets to Assets-at-Risk.* https://www.i4ce.org/wp-content/uploads/2024/06/From-Stranded-Assets-to-Assets-at-Risk.pdf

ICCR. (2024). *ICCR's 2024 Proxy Resolutions & Voting Guide.* https://www.iccr.org/wp-content/uploads/2024/02/2024-ICCR-Proxy-Resolutions-and-Voting-Guide02.16.24-medium.pdf

ICCT. (2023). *Vision 2050: Update on the global zero-emission vehicle transition in 2023.* https://theicct.org/wp-content/uploads/2023/09/Global-ZEV-update_final.pdf

ICCT. (2024). *Which automakers are shifting to green steel? An analysis of steel decarbonisation commitments.* https://theicct.org/wp-content/uploads/2024/09/ICCT-Green-Steel-Supply.pdf

ICMA. (2021). *Green Bond Principles*. https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Green-Bond-Principles-June-2021-100621.pdf

References

IFRS. (2023). *IFRS S2 Climate-related Disclosures.*
https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/ifrs-s2-climate-related-disclosures/

IFRS. *Introduction to the ISSB and IFRS Sustainability Disclosure Standards.*
https://www.ifrs.org/sustainability/knowledge-hub/introduction-to-issb-and-ifrs-sustainability-disclosure-standards/

InfluenceMap. (2023). *The Korea Automobile Manufacturers Association and Climate Policy.*
https://influencemap.org/briefing/-ff01a578e9bd224294a3d1ed50469587-20598

InfluenceMap. *Appendix B: Climate Policy Engagement of The Korea Automobile Manufacturers Association (KAMA) and Corporate Members.*
https://influencemap.org/site/data/000/021/Appendix_B._Climate_Policy_Engagement_of_the_Korea_Automobile_Manufacturers_Association_(KAMA)_and_Corporate_Members.pdf

InfluenceMap. *BMW Group Disclosure Scorecard.*
https://ca100.influencemap.org/livescorecard/BMW-Scorecard-37270

Legal & General Investment Management. (2025). *Climate Impact Pledge 2025.*
https://am.landg.com/asset/4a40f9/globalassets/lgim/_document-library/climate-impact-pledge/cro_climate-impact-pledge_2025.pdf/

LobbyMap. *Hyundai Motor Group.*
https://lobbymap.org/company/Hyundai-Motor

LobbyMap. *Korea Automobile & Mobility Association (KAMA).*
https://lobbymap.org/influencer/Korea-Automobile-Manufacturers-Association-KAMA-10e51d0d155f36ef70990dbc191e23be/projectlink/Korea-Automobile-Manufacturers-Association-KAMA-in-Climate-Change-bd958bcf072ba4f4cbf8917b9dc2edf6

LobbyMap. *SAIC Motor.*
https://lobbymap.org/company/Saic-Motor-a1b706228303c63e68b65553f640d44f/projectlink/Saic-Motor-in-Climate-Change-13829a2e662d09da613ee69f75b01332

LobbyMap. *Toyota Motor.*
https://lobbymap.org/company/Toyota-Motor

References

London School of Economics. (2024). *Global trends in climate change litigation: 2024 snapshot.*
https://www.lse.ac.uk/granthaminstitute/publication/global-trends-in-climate-change-litigation-2024-snapshot/

Mercedes-Benz. (2025). *Climate Policy Report 2024*.
https://group.mercedes-benz.com/dokumente/investoren/berichte/geschaeftsberichte/mercedes-benz/mercedes-benz-ir-climate-policy-report-fy-2024.pdf

Mercedes-Benz. (2025). *Climate Transition Action Plan 2025*.
https://group.mercedes-benz.com/documents/investors/reports/annual-report/mercedes-benz/mercedes-benz-climate-transition-action-plan-2025.pdf

Moody's. (2022). *ESG Scores Explained: Quantifying the degree of credit impact*.
https://ma.moodys.com/rs/961-KCJ-308/images/Presentation%20Deck.pdf

MSCI. (2021). *FAQ – Understanding MSCI Climate Indexes*.
https://www.msci.com/documents/10199/28284207/FAQ-Understanding-MSCI-Climate-Indexes.pdf

Network for Greening the Financial System. (2023) *Climate-related litigation: recent trends and developments*.
https://www.ngfs.net/system/files/import/ngfs/medias/documents/ngfs_report-on-climate-related-litigation-recent-trends-and-developments.pdf

Norges Bank Investment Management(NBIM). (2024). *Responsible Investment 2024*.
https://www.nbim.no/contentassets/ad990bb856b94063aa2165c3715a7a85/gpfg-responsible-investment-2024.pdf

NZAM. (2022). *NET ZERO ASSET MANAGERS INITIATIVE.*
netzeroassetmanagers.org/media/2022/05/NZAM-Initial-Target-Disclosure-Report-May-2022-1.pdf

OECD. (2021). *Financial Markets and Climate Transition*.
https://www.oecd.org/en/publications/financial-markets-and-climate-transition_ab4655d6-en.html

RBC Capital Markets. (2022). *Ford Breaks Green Bond Record With $2.5 Billion Sale.*
https://www.rbccm.com/en/insights/story.page?dcr=templatedata/article/insights/data/2022/02/ford_breaks_green_bond_record
Renault Group. (2024). Climate Report 2024.https://assets.renaultgroup.com/uploads/2025/03/RENAULT_Rapport_Climat_2024_GB_1920×1080pix_V1_prol_MEL.pdf

References

Renault Group. (2024). *Universal Registration Document 2023.*
https://www.renaultgroup.com/en/responsability/all-the-documentation/

Reuters. (2024). *Britain eyes 2026 start for tougher company climate disclosures.*
https://www.reuters.com/sustainability/climate-energy/britain-eyes-2026-start-tougher-company-climate-disclosures-2024-05-16/

Reuters. (2024). *Momentum building behind global company climate disclosures, standards body says.*
https://www.reuters.com/business/environment/momentum-building-behind-global-company-climate-disclosures-standards-body-says-2024-05-28/

RMI. (2020). *Climate Scenario Analysis SAIC Report 2019.*
https://pacta.rmi.org/wp-content/uploads/2020/01/ScenarioAnalysis_SaicMotorCorpLtd.pdf

S&P Global. (2025). *Where does the world stand on ISSB adoption?*
https://www.spglobal.com/sustainable1/en/insights/march-2025-where-does-the-world-stand-on-issb-adoption

SAIC Motor Corporation. (2025). *2024 ESG & Sustainability Report.*
https://www.saicmotor.com/english/download/esg/2024.pdf

SAIC Motor Corporation. (2025). *2024 SAIC TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES (TCFD) REPORT.*
https://www.saic.com/sites/default/files/2024-08/SAIC_2024_TCFD.pdf

Sina Finance. *上汽集团：2024 年度环境、社会和公司治理报告 (下载公告).*
https://vip.stock.finance.sina.com.cn/corp/view/vCB_AllBulletinDetail.php?stockid=600104&id=11071772

Stellantis. (2025). *2024 Expanded Sustainability Statement.*
https://www.stellantis.com/content/dam/stellantis-corporate/sustainability/esg-disclosures/Stellantis-Expanded-Sustainability-Statement-2024.pdf

Stellantis. (2025). *Climate Policy Report 2024/2025.*
https://www.stellantis.com/content/dam/stellantis-corporate/sustainability/csr-disclosure/stellantis/2024/Stellantis-2024-Climate-Policy-Report.pdf

References

Supply Chain Dive. (2025). *Ford asks investors to vote down supply chain emissions proposal.*
https://www.supplychaindive.com/news/ford-supply-chain-emissions-proposal/743902/

TCFD. (2018). *2018 Status Report Task Force on Climate-related Financial Disclosures (TCFD).*
https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2018-TCFD-Status-Report-092518.pdf

Tesla. (2023). *Master Plan Part 3.*
https://www.tesla.com/ns_videos/Tesla-Master-Plan-Part-3.pdf

Tesla. (2024). *2023 Impact Report.*
https://www.tesla.com/ns_videos/2023-tesla-impact-report.pdf

The Church of England. (2022). *Investors Challenge Volkswagen Climate Lobbying.*
https://www.churchofengland.org/media/press-releases/investors-challenge-volkswagen-climate-lobbying

The Wall Street Journal. (2024). *Children Argued Their Country's Climate Efforts Were Shoddy. A Top Court Agreed.*
https://www.wsj.com/world/asia/south-korean-children-sued-the-government-over-climate-policy-they-just-won-bd37201e

Toyota Motor Corp. (2021). *Toyota Financial Services Issues New Asset-Backed Green Bond, Highlighting Toyota's Ongoing Commitment to Sustainability.*
https://pressroom.toyota.com/toyota-financial-services-issues-new-asset-backed-green-bond-highlighting-toyotas-ongoing-commitment-to-sustainability/

Toyota Motor Corp. (2025). *Sustainability Data Book 2024.*
https://global.toyota/pages/global_toyota/sustainability/report/sdb/sdb24_en.pdf

UN PRI. (2023). *ESG in credit ratings and ESG ratings.*
https://www.unpri.org/credit-risk-and-ratings/esg-in-credit-ratings-and-esg-ratings/11071.article

UN PRI. (2023). *The PRI's Investor Data Needs Framework.*
https://www.unpri.org/driving-meaningful-data/the-pris-investor-data-needs-framework/11431.article

United Kingdom Government. (2024). *UK Sustainability Reporting Standards.*
https://www.gov.uk/guidance/uk-sustainability-reporting-standards

References

United Kingdom Government. (2025). *Exposure draft of UK Sustainability Reporting Standards: UK SRS S1 and UK SRS S2.*
https://www.gov.uk/government/consultations/exposure-drafts-uk-sustainability-reporting-standards/exposure-draft-of-uk-sustainability-reporting-standards-uk-srs-s1-and-uk-srs-s2

United States Senate Lobbying Disclosure. *Hyundai Motor Company.*
https://lda.senate.gov/filings/public/contribution/search/?registrant=hyundai+motor&registrant_lobbyist=&report_period=&report_year=&report_dt_posted_from=&report_dt_posted_to=&report_filing_uuid=&report_house_doc_id=&contribution_date_from=&contribution_date_to=&contribution_amount_min=&contribution_amount_max=&contribution_type=&contribution_contributor=&contribution_payee=&contribution_honoree=&search=search

Volkswagen. (2024). *Volkswagen Group posts solid growth in deliveries in 2023 and strong increase in all-electric vehicles.*
https://www.volkswagen-group.com/en/press-releases/volkswagen-group-posts-solid-growth-in-deliveries-in-2023-and-strong-increase-in-all-electric-vehicles-18057

Volkswagen. (2025). *2024 Annual Report*.
https://www.volkswagen-group.com/en/annual-report-and-full-year-results-2024-19005

Volkswagen. (2025). *Association Cliamte Review 2024.*
https://www.volkswagen-group.com/en/publications/corporate/association-climate-review-2024-3038

Volkswagen. (2025). *Volkswagen Annual Report 2024.*
https://annualreport2024.volkswagen-group.com/notes/other-disclosures/litigation.html

Volkswagen. *ESG Factbook*.
https://www.volkswagen-group.com/en/esg-factbook-15801

World Benchmarking Alliance. *Hyundai Motor Company.*
https://www.worldbenchmarkingalliance.org/publication/automotive-transport/companies/hyundai-motor-2/

World Resources Institute. *Beyond Net Zero.*
https://publications.wri.org/beyond-net-zero-passive-investing