

GREENPEACE

Automobile Environmental Guide

2023 Edition

A comparative analysis of decarbonisation
efforts by global automakers



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Executive summary

The year 2022 was defined by extreme climate events. Floods in Pakistan, China, Nigeria, and elsewhere; Hurricane Ian in the Americas; tropical storms in the Philippines; and record-setting heat waves and cold spells in both hemispheres were just a few of the extreme weather events that wreaked havoc on our planet and caused destruction to numerous communities. As the global population and ecosystems continue to adapt and cope with the consequences of the climate crisis, the need to decarbonise the auto industry remains as urgent as ever.

The global transport sector's carbon emissions rose by 2.1% in 2022, an increase of 137 metric tonnes of carbon dioxide (CO₂) from the year prior.¹ The automotive industry is a significant contributor to global carbon emissions. Ground transport, which consists of passenger and freight vehicles, accounted for 17.9% of global carbon emissions in 2022.² Within the transport sector, passenger vehicles represent the greatest share of emissions, comprising 45% of the sector's CO₂ emissions in 2018.³

Despite the rising popularity of electric vehicles (EVs) in recent years, CO₂ emissions from the transport sector have continued to grow at a rate that exceeds all other end-use sectors, except industry.⁴ Decisive measures and strong leadership from the automotive industry are necessary to enable the mass adoption of EVs and swift phase-out of internal combustion engine (ICE) vehicles. Necessary measures include targeted and ambitious ICE phase-out regulations and legislation, and investment in EV-compatible infrastructure.

For the automotive industry, a full phase-out of the sales of ICE passenger vehicles is necessary for the industry's decarbonisation progress to be compatible with the 2050 net zero emissions future.

With rising consumer demand for EVs and regulatory requirements on the reduction of tailpipe emissions, traditional carmakers are losing market share to EV-focused carmakers.

Carmakers need to keep up with public demand for EVs as the era of combustion engines and fossil fuel dependency comes to an end.

According to the International Energy Agency, global carbon emissions need to decrease by at least 3% per year until 2030 in order to reach net zero emissions by 2050.⁴ For the automotive industry, a full phase-out of the sales of ICE passenger vehicles is necessary for the industry's decarbonisation progress to be compatible with the 2050 net zero emissions future.⁵ In 2022, the world's 15 largest traditional automakers sold a staggering 55.5 million fossil fuel vehicles, compared to just 3.3 million zero-emission vehicles (ZEV). In other words, ICE vehicles comprised 94.4% of total car sales among the top 15 traditional automakers in 2022, only a slight decrease from 99.5% in 2018.

Traditional carmakers are facing market-related and regulatory challenges. With rising consumer demand for EVs and regulatory requirements on the reduction of tailpipe emissions, traditional carmakers are losing market share to EV-focused carmakers that are adjusting to the changing landscape of the automobile market. Within the automotive industry, investors and asset managers respond to these market and policy changes and are increasingly concerned about carmakers' decarbonisation efforts.

The race towards electrification is on. Carmakers need to keep up with public demand for EVs as the era of combustion engines and fossil fuel dependency comes to an end. On a larger scale, carmakers need to take accountability for their contribution to the climate crisis and lead the industry towards electrification and carbon neutrality. Electrification and carbon neutrality efforts do not merely entail an end to tailpipe emissions, but also a restructuring of the automotive industry's manufacturing and materials procurement process. The first step towards achieving a carbon-neutral automotive sector is to articulate appropriate targets, which carmakers must then propel into action.

The Auto Environmental Guide 2023 examines carmakers' decarbonisation efforts under three pillars: (1) ICE phase-out, (2) supply chain decarbonisation, and (3) resource reduction and efficiency. These three pillars address tailpipe emissions, production-related emissions, and materials procurement-related emissions, and the weighting corresponds to lifecycle emissions of the average passenger vehicle.

Sector-wide findings

- Despite rapid growth in EVs, ICE vehicles continue to dominate the global automotive market.** The world's 15 largest traditional automakers sold 3.3 million ZEVs in 2022, compared to 55.5 million ICE vehicles. For traditional automakers, the portion of ICE vehicles sold each year remains high. ICE vehicles still accounted for 94.4% of total vehicles sold by the largest 15 automakers in 2022, compared to 99.5% in 2018.
- Traditional automakers are losing the race when it comes to ZEV sales.** While the 15 largest traditional automakers accounted for 74% of global auto market share in 2022, their ZEV market share the same year was just 43%. Traditional automakers remain focused on selling ICE vehicles while the rest of the industry has progressed towards electrification. The top 15 traditional carmakers saw a 47% growth in ZEV sales for the period 2021 to 2022, behind the global growth rate of 69% for the same period.
- Global ZEV sales are on the rise, but progress has been uneven.** ZEV sales for the world's 15 largest traditional automakers rose from 2.2 million units in 2021 to 3.3 million units in 2022 – an increase of more than 1 million units in one year. Five years prior, the global ZEV sales figure was only 0.4 million. However, while some traditional automakers have made relative progress in the transition toward ZEVs, others are falling far behind. In 2022, the best performing carmaker among the 15 largest traditional carmakers sold three ZEVs per ten cars sold, while the worst performing carmaker sold zero ZEVs.
- Traditional automakers have failed to substantially increase ZEV sales outside China and Europe.** Traditional automakers have increased ZEV sales in China and the European Union (EU), where they have benefited from government incentives, but the ZEV market penetration rate in other regions remains low. Traditional automakers continue to sell high volumes of ICE vehicles in the Global South, which perpetuates fossil fuel consumption and is inconsistent with the automakers' climate commitments.
- Automakers' existing decarbonisation targets are insufficient to limit the global average temperature increase to 1.5°C.** Few traditional automakers have released comprehensive sustainability plans that include targets for both the phase-out of ICE vehicles and the decarbonisation of supply chains and upstream materials. Even for automakers that received the highest scores for decarbonisation targets, their pledges fall short of the level of ambition needed to limit the global average temperature increase to 1.5°C, which, according to the International Energy Agency, requires a full phase-out of ICE vehicles by 2035.⁵ In general, in 2022 the world's 15 largest automakers achieved only sluggish decarbonisation efforts and targets that fell short of the ambition level needed to achieve emission reductions in line with the Paris Agreement.
- Sports utility vehicle (SUV) sales continue to grow at an alarming rate, representing a major climate threat due to the high energy consumption of these vehicles.** In 2022, 34.4 million SUVs were sold globally⁶, an increase of 1.1 million from 2021. Due to their high steel consumption and low fuel efficiency, SUVs have a higher carbon footprint than smaller-sized vehicles. Over the past three years, two-thirds of the 15 carmakers in the ranking reported increased sales of SUVs as a portion of total auto sales. In 2022, SUVs comprised more than half of global auto sales by Hyundai-Kia (53%) and Great Wall (72%), compared to 37% for Toyota, 44% for Volkswagen, 40% for General Motors, and 36% for Stellantis.
- Investment in renewable energy charging by the world's biggest automakers is inadequate.** As demand for electricity to power ZEVs increases, carmakers should boost renewable energy capacity to meet the additional demand. Carmakers should procure renewable energy through power purchase agreements (PPAs) and direct investment, while refraining from buying unbundled renewable energy certificates (RECs) as their renewable energy additionality is debatable.⁷
- Automakers have neglected the critical role that supply chains and materials play in decarbonisation.** The automakers' decarbonisation strategies tend to centre around curbing tailpipe emissions by producing and selling more ZEVs. Industry-wide, there is insufficient emphasis placed on emissions that originate from the supply chain, materials, and production, such as the energy consumed in manufacturing plants and upstream emissions from steel procurement. Ultimately, omitting to include lifecycle energy consumption for ZEVs could lead to unchecked emissions.

Comparative analysis findings

- Mercedes-Benz and BMW are the top scorers in this year's ranking**, but the rate at which the companies are increasing ZEV sales and phasing out ICE vehicles is not in line with limiting the global average temperature increase to 1.5°C.⁵ The companies' ZEV production capacity is insufficient and trails far behind EV-focused carmakers such as Tesla and BYD.
- SAIC achieved the highest volume of ZEV sales in 2022 among the 15 automakers in the ranking**, both proportionately and in absolute numbers. In 2022, SAIC was responsible for more than one in every four ZEVs sold by the 15 automakers and it is the only automaker included in this guide with sizable ZEV sales in emerging markets such as India, Thailand, and Indonesia. However, SAIC scored poorly on supply chain and materials decarbonisation, bringing down the company's overall score. In 2022, SAIC's Chinese counterparts, Changan and Great Wall, also sold relatively high volumes of ZEVs, at 11% and 9%, respectively. Changan and Great Wall have not issued adequate commitments to reduce emissions from production and materials procurement.
- Once again Toyota was one of the lowest ranked companies, behind domestic rivals Nissan and Honda.** Fewer than one in 400 vehicles sold by Toyota in 2022 were ZEVs, and the automaker has not improved on its commitment to phase out ICE vehicles since 2021. Meanwhile, in 2022 Honda showed a stronger increase in ZEV sales as a percentage, while Nissan committed to the phase-out of ICE vehicles sales in Europe by 2030. As the world's largest carmaker, Toyota's transition to EVs is too slow to expedite the end of the fossil fuel era.
- Hyundai-Kia continues to increase its SUV sales, which contributes to additional carbon emissions.** The share of SUVs to Hyundai-Kia's total sales has continued to rise over the past five years and reached a record high level in 2022, when for the first time, SUVs contributed to more than half of the company's total auto sales. Hyundai-Kia's reliance on SUVs to boost its sales numbers contradicts the company's claims of having a sustainable profile and is indicative of a lack of effort in reducing its carbon footprint. Hyundai-Kia's ZEV sales proportion, which has only increased by 1-2 percentage-points per year over the past five years, severely lags behind many of its peers. The company's commitment to reach carbon neutrality by 2045 is not backed up by its decarbonisation targets.
- Volkswagen, Stellantis, and Renault have increased their ZEV sales, but not as rapidly as some of their rivals.** Volkswagen lost points due to its lack of progress on supply chain decarbonisation. Stellantis' decarbonisation efforts have not substantially improved over the past year and fail to reflect the urgency of the climate crisis. Stellantis reported a low proportion of ZEVs in its total sales and lacks comprehensive decarbonisation targets. Renault continues to default on its supply chain decarbonisation efforts. Although in 2022 Renault reported the third highest percentage of ZEV sales among the top 15 traditional automakers, it lost points due to its unambitious ICE phase-out plans and lack of specific actions to reduce its supply chain carbon footprint.
- Ford's ZEV growth is an improvement but its ZEV sales figures remain low.** Ford's efforts in growing its ZEV manufacturing capacity and sales figures are evident by the high compound annual growth rate (CAGR) that the carmaker achieved between 2018 and 2022, and sales of more than 100,000 ZEVs in 2022. However, in 2022 the proportion of ZEVs sold as part of Ford's total sales remained less than 3%. Ford needs to accelerate the growth of its ZEV sales to help limit the global average temperature increase to within 1.5°C.
- General Motors sank in rank as sales under Sino-foreign joint ventures are reclassified.** General Motors dropped from 1st to 5th place as sales of vehicles bearing Chinese marques from Sino-foreign joint ventures are classified under the Chinese joint venture partner, a change compared to the 2022 ranking. The sales figures of Wuling and Baojun, two Chinese marques manufactured by the SAIC-GM-Wuling joint ventures and primarily sold in China, contributed to General Motors' high ZEV sales volume in the 2022 Auto Environmental Guide and are now reclassified under SAIC's sales figures in the 2023 guide. Wuling's Hongguang Mini EV was the third best selling ZEV globally in 2022, behind Tesla's Model Y and Model 3.⁸
- Suzuki received the lowest score of all automakers in this year's ranking.** The company did not have a ZEV development and sales plan until its "Growth Strategy for FY2030" was announced in January 2023, which specified the timeline of EV introduction into the European, Japanese, and Chinese markets.⁹ Suzuki's supply chain and materials decarbonisation commitments lack ambition and quantifiable targets.
- Japanese automakers, including Toyota, Honda, and Nissan, are losing market share in Europe, China, and the United States (US) due to their slow transition to EVs.**¹⁰ Japan's government offers few incentives for EV production, placing Toyota, Honda, and Nissan at a disadvantage in the EV transition compared to other global automakers.

Demands

Based on the findings of this report, there are a number of steps that automakers can take to achieve the level of decarbonisation necessary to keep global average warming below an increase of 1.5°C, as per the Paris Agreement. Whilst the specific timelines and details of the following recommendations will vary by region, these need to be enacted across all markets and throughout the entire supply chain.

1. Speed up ICE phase-out

The top car manufacturers should take robust action to address the climate emergency at a level of ambition that matches their advantage of scale and global market penetration. We demand that leading global automakers end the sale of ICE vehicles in their main markets (US, China, South Korea, and Japan) before 2030. In Europe, they should end the sale of ICE vehicles by 2028. Workers' voices must be central to the transition and their benefits should be protected.

2. Promote renewable energy charging

Automobile companies should strive to promote renewable energy charging and increase renewable energy generation. As the world's ZEV fleet grows, the additional electricity demand driven by EVs needs to be met by renewable energy. ZEVs are only truly zero-carbon if the electricity that powers them is produced by renewable sources.^{11,12}

3. Fast-track steel decarbonisation

Steel comprises the largest part of a car's carbon footprint at the manufacturing stage, contributing half of cradle-to-gate emissions. Automobile companies should take action to decarbonise steel by auditing and disclosing the carbon footprint of their production materials, committing to purchasing low-carbon steel, setting steel carbon reduction targets, producing fewer SUVs, and fast-tracking the technological development of zero-carbon steel.

4. Supply chain decarbonisation and resource reduction

Automakers must build the capacity required to reuse and recycle batteries, with the goal of reducing resource consumption, carbon emissions, and other environmental impacts, as well as improving the efficiency of repurposing and recycling.

5. Ensure a just transition

Automakers and policymakers must leverage all the tools at their disposal to manage the phase-out of ICE vehicles, while engaging early and often with workers, unions and labour organisations, and other stakeholders. Automakers have a responsibility to plan for robust investments and policies that will maximise a just transition to protect the economic, social, and physical health and well-being of workers and surrounding communities. Policies for industrial transition need to be implemented together with bold investments and an expansion of social safety net programmes and commitments to ensure that workers' voices are prioritised.

6. Rethink mobility and reduce private car ownership

We should be cautious not to grow the car market in the name of phasing out ICE vehicles. To achieve a meaningful climate impact, the phase-out of ICE vehicles must be accompanied by a reduction in the overall size of the global auto fleet. Ultimately, a zero-carbon mobility future must involve far fewer private cars, more efficient public transport systems, more car sharing options, and the redesign of cities to make space for walking and cycling. Automakers will need to fundamentally rethink their business models, which are currently based on a need to sell cars at an ever-increasing pace, while governments need to devise economic strategies to steer the world towards a zero-emission future.

2023 Scorecard

Companies	Rank	Total score (out of 100)	ZEV proportion in 2022 (25% of total score)	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction & efficiency	Deduction
Mercedes-Benz	1	41.1	7.25%	25.6	13.0	3.0	-0.5
BMW	2	40.0	10.32%	25.0	13.0	2.5	-0.5
SAIC	3	35.3	30.93%	36.8	-1.0	0.0	-0.5
Ford	4	28.9	2.74%	18.9	10.0	0.5	-0.5
General Motors	5	27.6	1.90%	16.1	12.0	0.5	-1.0
Volkswagen	6	26.6	7.29%	19.1	6.0	2.0	-0.5
Stellantis	7	26.3	4.98%	15.8	11.0	0.5	-1.0
Renault	8	24.5	10.59%	16.0	7.0	2.0	-0.5
Hyundai-Kia	9	20.5	5.58%	17.5	3.0	0.5	-0.5
Honda	10	14.7	0.67%	13.7	1.0	0.5	-0.5
Nissan	11	13.9	2.98%	9.9	1.0	3.5	-0.5
Changan	12	12.5	11.52%	13.5	-1.0	0.0	-0.0
Toyota	13	12.4	0.24%	7.9	4.0	1.0	-0.5
Great Wall	14	10.8	9.02%	11.8	-1.0	0.0	-0.0
Suzuki	15	3.2	0.00%	1.7	1.0	0.5	-0.0

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1



Introduction



1.1 2022 in review

- 3.9% of all passenger vehicles sold in 2022 were zero-emission vehicles (ZEVs).¹³
- China, Europe, and United States (US) account for 65.5% of all passenger vehicle mileage driven in 2022. China has surpassed all other markets to become the world's biggest ZEV market.¹³
- China's fiscal EV subsidy scheme, which had been in place for 14 years, ended on 1 January 2023. The scheme has been credited for China's high EV adoption rate.¹⁴
- In October 2022, the European Union (EU) came to a landmark agreement that by 2035, 100% of passenger cars and vans sold would be ZEVs. Germany's sudden opposition to the terms of the agreement led to a last-minute reformulation that exempted e-fuel vehicles from the ban.¹⁵
- The US Environmental Protection Agency and the Biden–Harris administration considered regulations to require around two-thirds of all passenger vehicle sales to be electric vehicles (EV) by 2032. The current target is 50% by 2030 and the target for the proposed rule is from 64% to 67%.¹⁶
- The Biden–Harris administration provided fiscal incentives to EV drivers in the US by expanding tax credits for the purchase of both new and secondhand EVs through the Inflation Reduction Act.¹⁷

1.2 Global developments

The rebound

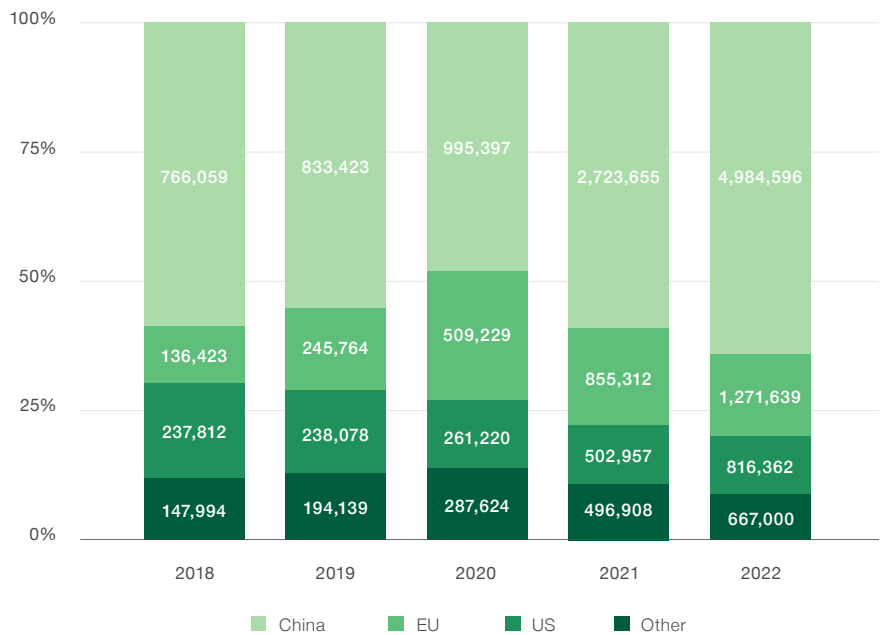
As the world adapts to a new normal following the COVID-19 pandemic, the automotive industry is witnessing a rebound of passenger car sales. The sales performance of the automotive industry in 2022 remained below pre-pandemic levels, falling just short of 80 million vehicles sold. At the same time, the entire industry is grappling with a changing landscape in which ZEVs dominate public discourse about the future of transportation. 2022 saw an astronomical rise in worldwide ZEV sales, with a record-setting 7,739,597 units sold, an increase of 68% from 2021 and up 277% from 2020. For the entire auto industry, including EV-focused brands, ZEVs as a portion of total sales rose from 5.72% in 2021 to 9.72% in 2022. This trend is forecasted to continue into 2023. In the first quarter of 2023, every seventh car sold was a ZEV.¹

The three biggest EV markets

Just three markets – China, EU, and the US – accounted for 83% of total EV sales in 2022. In 2022, China’s market share was unrivalled, at 60% of the global ZEV market. EV sales growth is observed in certain emerging markets, particularly India, Indonesia, and Thailand, which saw a tripling in EV sales from 2021 to 2022, potentially foreshadowing an electromobility boom.¹⁸

Figure 1.

Regional share of ZEV sales for the period 2018 to 2022 (Source: Greenpeace compilation based on data from Marklines)



i All primary data was derived from Marklines and analysis was conducted by Greenpeace East Asia.

China's long-standing fiscal EV subsidy scheme has been a major driver of EV adoption, propelling the country to become the biggest EV market in the world in terms of sales volume. On 1 January 2023, the subsidies that began in 2009 expired. These subsidies were aimed at providing financial incentives for automobile buyers at a time where the price of EVs was generally higher than that of internal combustion engine (ICE) vehicles.

The Chinese government's goal of achieving 20% EV deployment by 2025 is still upheld.¹⁹ In 2023, EV buyers are still eligible to receive the 10% purchase tax exemption, and car companies are encouraged to have higher EV sales in order to comply with the government's requirement under the "dual-credit scheme".¹⁴ Besides national-level subsidies, some local governments have implemented tax breaks and stimulus measures to boost demand for EVs.²⁰ As Chinese carmakers ramp up their EV production, carmakers from Japan, Europe, and the US are on track to cede market share in the Chinese EV market, according to a report by Greenpeace East Asia.¹⁰ In recent years, European carmakers have increased the production capacity of EVs and their parts in China in response to demand and limited production capacity in their home markets.²¹

The **European Union** reached a landmark decision to ban the sales of new ICE vehicles from 2035. The European Parliament states that "from 2035, all new cars that come on the market cannot

emit any carbon dioxide". The ban includes plug-in hybrid electric vehicles (PHEVs), but the sale of secondhand ICE vehicles will still be permitted after 2035.¹⁵

In March 2023, the EU proposed the Net Zero Industry Act, with the objective that EU battery manufacturers meet almost 90% of battery demand from the EU, in light of supply chain issues and a global shortage of key minerals for EV battery production.¹⁶ The European Parliament's impending 2035 ban on ICE vehicles reached its final form in October 2022, was approved by Parliament in February 2023, and entered into force in April 2023. In a dramatic turn of events, Germany requested changes to the 2035 ICE vehicles ban, namely to allow the sales of ICE vehicles that run on e-fuels, a move that the opposition feared would weaken regulatory incentives to electrify.²²

In **the United States**, the Biden-Harris administration reaffirmed its 2021 "Build Back Better Framework" commitment²³ for the sales of light-duty ZEVs to reach at least 50% by 2030²⁴ through the Inflation Reduction Act¹⁷ which expanded tax credits for the purchase of new and secondhand EVs, and the Bipartisan Infrastructure Law, which funded the building of EV charging networks and EV batteries production.²⁵ In March 2022, the US Securities and Exchange Commission proposed a set of regulations to require public companies to disclose their Scope 3 emissions which would be subject to auditing. The regulations have yet to be finalised.²⁶

ICE vehicle holdout markets: overview of decarbonisation policies

Outside of China, EU, and the US, policymakers in ICE vehicle holdout markets have issued varying commitments to electrify their transport sectors. ICE vehicle holdout markets are markets in which ICE vehicles dominate automotive sales and the sales of ZEVs have yet to establish a foothold.

Australia announced a ban on the sales of ICE vehicles in the Australian Capital Territory (ACT) from 2035. The ACT comprises just 0.03% of Australia's total land area and 1.7% of its population, underscoring the necessity for federal-level action.

Brazil has proposed a ban on the sales of all fossil fuel-powered vehicles by 2060.²⁷

Canada has set a mandatory target to only allow the sales of ZEVs from 2035.²⁸

India has set a national target for 30% of total passenger vehicle sales to be EVs by 2030, including battery electric vehicles (BEV) and PHEVs. In addition, the government aims to promote local manufacturing of EV components.²⁹

Indonesia aims for 100% of its sales of passenger vehicles and two-wheelers to be EVs by 2050. In this case, the definition of EVs includes both ZEVs and PHEVs.^{30,31}

Japan's '2050 Carbon Neutral Green Growth Strategy', introduced in 2020, proposes 100% EV and hybrid electric vehicle (HEV) sales by the mid-2030s. It is not considered a full ICE ban as HEV sales will still be allowed.^{32,33}

Mexico is a signatory to the non-binding 26th United Nations Climate Change conference (COP26) declaration but has not adopted any ICE phase-out targets.³⁴

The Philippines' Department of Energy will limit the sales of ICE vehicles by 2040. All new vehicles sold from 2040 will be EVs, but in this case the definition of EVs includes PHEVs.³⁵

South Korea's 'Fourth Eco-Friendly Vehicle Master Plan' stipulates that 30% of light-duty vehicle supply will have to be 'eco-friendly' by 2030, of which 50% will be HEVs, 39% PHEVs and BEVs, and 11% fuel cell electric vehicles (FCEV).³³

Thailand mandates all sales of new vehicles to be ZEVs by 2035.³⁶

Turkey is a signatory to the non-binding COP26 declaration but has not adopted any ICE phase-out targets.³³

Vietnam has announced a plan to increase the production of EVs and phase out vehicles that use fossil fuels by 2040. Vietnam's strategy includes the use of biofuels. It is not considered a full ICE ban as PHEV sales will still be allowed.³⁷

Automotive steel decarbonisation

The automotive industry is one of the largest end-users of steel, representing about 16% of global steel consumption.³⁸ The world's 16 largest automakers consumed between 39 and 65 million tonnes of steel in 2022 and emitted approximately 74 million tonnes of carbon dioxide (CO₂), according to a Greenpeace East Asia analysis.^{39,40}

If carmakers were to issue clear commitments to procure decarbonised steel, it would send a strong signal to steel producers to invest in the low-carbon steel transition. However, to date, major traditional automakers have yet to publish specific targets for steel emissions reduction, or even to disclose their emissions from steel usage. Only General Motors and Ford are members of the First Movers' Coalition, which has declared that, by 2030, at least 10% of coalition members' procurement volume would meet the coalition's standard for near-zero emissions.⁴¹ In 2022, many car companies signed partnerships with steel producers to produce low-carbon steel, however the effect on carbon reduction may be overstated.⁴⁰

1.3 Updates to the 2023 guide

Selection of automakers

The Auto Environmental Guide 2023 features 15 of the world's largest traditional carmakers measured in total sales volume. Combined, these 15 carmakers comprised 74% of global passenger vehicles sales in 2022, with their ICE vehicle sales accounting for 70% of global sales of all passenger vehicle types and ZEV sales accounting for 4%. Carmakers that focus on EVs, for which EVs comprise more than 90% of their total sales, are excluded from the ranking, as this guide is designed to assess the decarbonisation performance of conventional ICE vehicles companies. As a consequence, the ranking excludes the major EV carmakers BYD and Tesla.

The classification of marques and joint ventures in China

Prior to 2022, Chinese authorities required foreign carmakers that wanted to sell cars in China to form joint ventures with China-based companies in a 50:50 Sino-foreign equity structure. Market access was given to foreign carmakers in exchange for technology transfer from which the domestic partner would benefit, with the aim of developing China's automotive manufacturing industry. Today, a number of larger Chinese carmakers sell cars under both domestic marques and foreign-branded joint ventures. In this ranking, we consider sales of cars under domestic marques to fall under the China-based carmaker, while sales of cars sold under Sino-foreign joint ventures with the foreign carmaker's marque are accorded to the foreign carmaker. Notably, Wuling and Baojun cars are domestic marques that are considered under the sales figures of SAIC Motor. The shift in attribution has been updated since the 2022 Auto Environmental Guide⁴², which is one of the reasons that General Motors fell four places in the ranking. See Appendix II for the list of marques under each carmaker.

ICE vehicle holdout markets

Globally, 100% phase-out plans for ICE vehicles remain the exception. Carmakers can take a more active role to increase the availability of ZEVs in global markets, particularly in ICE vehicle holdout markets, which are markets where ICE vehicles dominate automotive sales and the sales of ZEVs have yet to establish a foothold. The electrification of the transport sector must be a global endeavour. In addition to total ZEV sales, the 2023 Auto Environmental Guide assesses the geographical distribution of carmakers' sales and credits carmakers that have a pronounced presence in ICE vehicle holdout markets.

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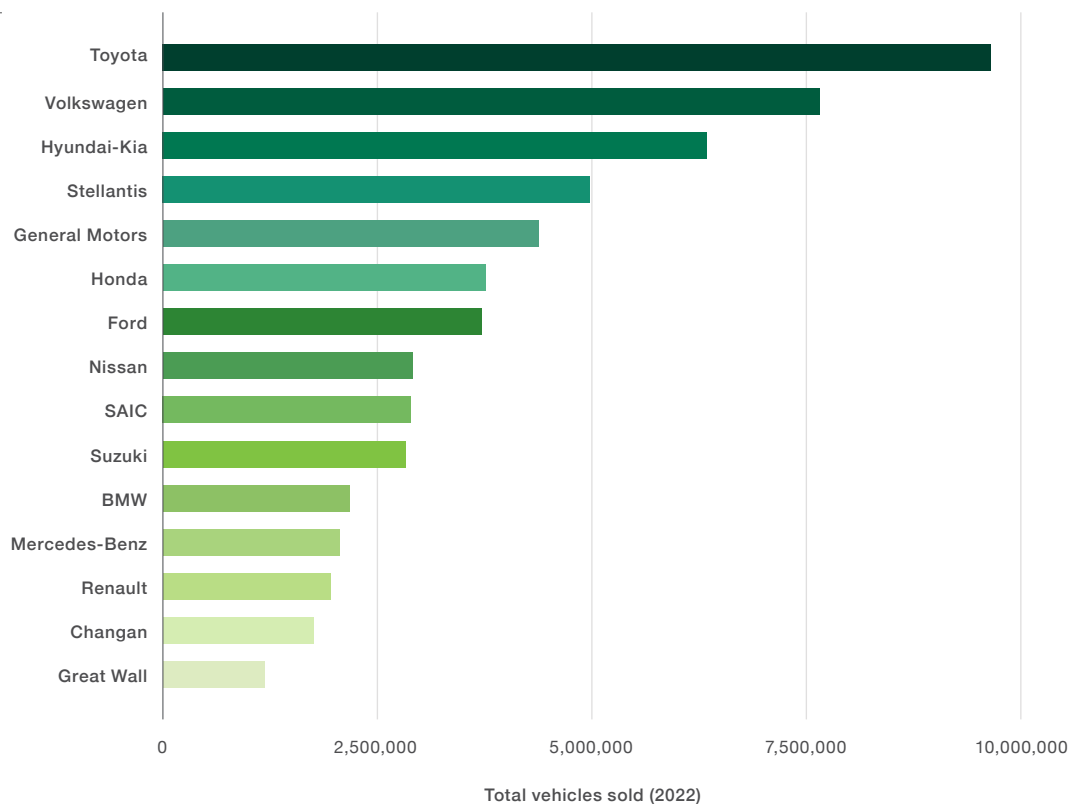
Methodology



The world's 15 largest carmakers by measurement in sales volume are assessed in this report. The names of the companies and their sales performance for 2022 can be found in Figure 2. All sales data were extracted from Marklines and retrieved between May and July 2023. Marklines data may differ from official sales figures provided by the companies. To ensure consistency in data sourcing, Marklines data are used for all sales-related evaluations. Information on carmakers' operational performance and other goals and targets was found in the companies' publicly released statements and reports. The latest version, as of 30 September, was used.

Figure 2.

The top 15 traditional automakers and number of vehicles sold in 2022
(Source: Greenpeace compilation based on data from Marklines)



Mergers & Acquisitions

Daimler / Mercedes-Benz

Daimler AG was renamed Mercedes-Benz Group AG in February 2022, three months after the car and truck manufacturing division of the then Daimler AG spun off as the independent company Daimler Truck AG. The current Mercedes-Benz Group AG focuses on the manufacturing of light-duty passenger car vehicles, and the renaming was announced to incur no changes to shareholders besides a new stock exchange symbol. Information about Mercedes-Benz Group AG for this report was searched for using the name of the company that was applicable during the relevant time period.

Stellantis

Stellantis debuted in early 2021 from the merger of PSA and FCA. Pre-2021 sales performance for Stellantis was summated by tallying up data from PSA and FCA. Assessments on ZEV sales proportion and CAGR from 2018 to 2022 were computed from the combined sales of the pre-merger companies.

Hyundai-Kia

Hyundai and Kia are evaluated as one entity – Hyundai-Kia – due to their shared technological and developmental platforms. Hyundai and Kia articulate separate internal combustion engine (ICE) phase-out targets and commitments and are therefore scored separately in that criterion; their overall score is calculated by combining their individual scores and weighted 60% and 40%, respectively, in accordance with their market shares.

Nissan and Renault

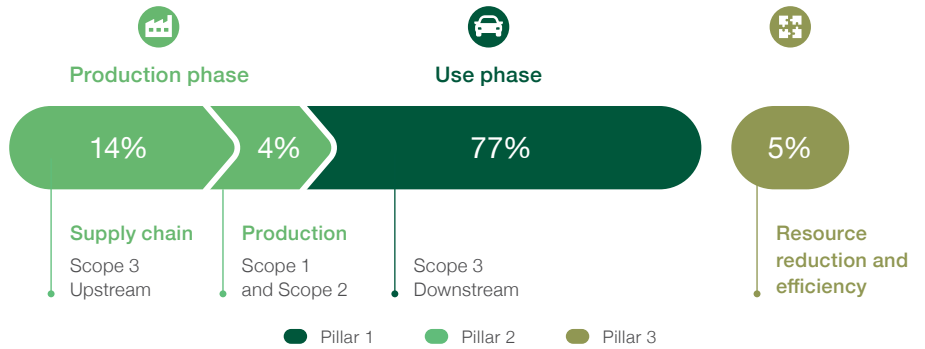
The Renault–Nissan–Mitsubishi Alliance debuted when Mitsubishi joined the Renault-Nissan Alliance in 2017. The partnership is a strategic alliance with cross ownership rather than a merger of the namesake carmakers – Renault Group, Nissan Motor Co. Ltd, and Mitsubishi Motors Corporation. Each company retains its own decision-making power. This report considers Renault and Nissan as independent carmakers.

2.1 Ranking guidelines

Carmakers are ranked on three pillars:

1. Performance on **ICE vehicle phase-out (77%)**
2. Performance on **supply chain decarbonisation (18%)**
3. Performance on **resource reduction and use efficiency (5%)**

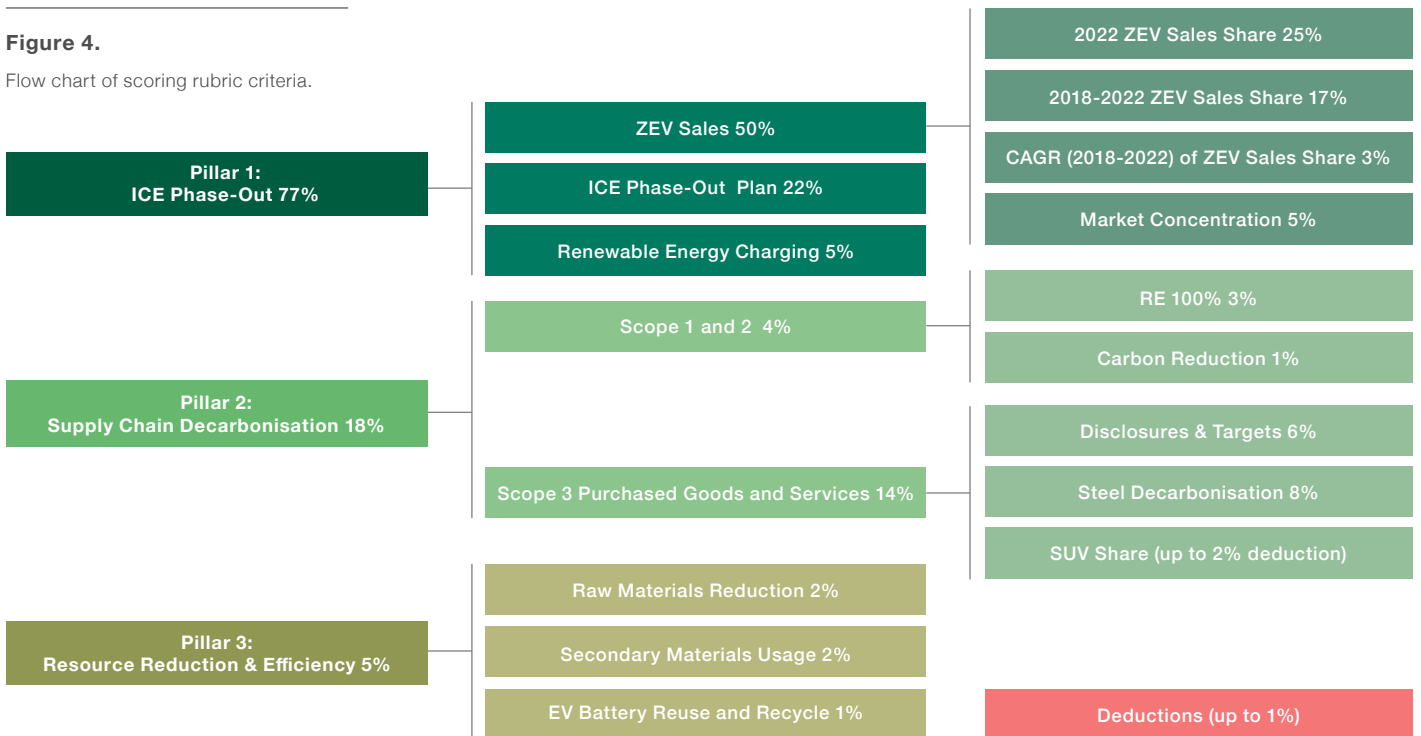
Figure 3.
Distribution of the three pillars.



The weights of the three pillars are assigned according to corresponding lifecycle emissions. Tank-to-wheel emissions, also referred to as ‘use phase emissions’, account for approximately 70% to 80% of lifecycle emissions for a conventional ICE vehicle, and efforts to phase out ICE vehicles are therefore allotted a weighted score of 77%. Emissions from purchased goods and services associated with the manufacturing process account for 18% of lifecycle emissions, which are addressed by supply chain decarbonisation. The remaining 5% of an automaker’s score is based on the reduction of resource consumption and the increase in resource use efficiency.

The highest score that a carmaker can obtain is 100. Carmakers can lose 1 point for policy violations, misconduct, or failure to support climate policies. A summary of the composition of the scoring rubric is provided in Figure 4.

Figure 4.
Flow chart of scoring rubric criteria.



2.2 ICE phase-out (77%)

ZEV sales proportion (42%)

Carmakers are scored based on the proportion of ZEVs in their total units sold in 2022 and for the period from 2018 to 2022. The ZEV sales performance of each carmaker is compared to a target value, and the score of each carmaker represents the distance between their sales performance and the target. The target values of 0.30 and 0.25 are used to assess the proportion of ZEV sales to total sales in 2022 and over the five-year period ending in 2022, respectively. The computed ratios are converted to a 25-point scale for single-year 2022 ZEV sales or 17-point scale for five-year 2018 to 2022 ZEV sales. The inclusion of both a one-year and a five-year timeframe is intended to reward carmakers that have shown a consistent track record in providing ZEVs to the market.

The equation used is shown below.

$$\text{ZEV proportion score} = \frac{\text{Observed ZEV sales proportion}}{\text{Target ZEV sales proportion}} \times \text{weight of criterion}$$

The weight of criterion is 25 for the proportion of ZEV sales in 2022 and 17 for the 5-year proportion of ZEV sales from 2018 to 2022.

ZEV compound annual growth rate (CAGR) (3%) criterion

The CAGR for the proportion of ZEV sales measures carmakers' progress in phasing out conventional ICE vehicles by tracking the growth of ZEVs as a proportion of automakers' total sales over the past five years. A higher CAGR denotes stronger growth in ZEV sales as a proportion of total sales, and thus faster progress in the phase-out of ICE vehicles. 3% of the overall score is assigned to the CAGR criterion.

The compound annual growth rate is calculated as follows:

$$\text{CAGR} = \left(\frac{\text{2022 ZEV sales proportion}}{\text{2018 ZEV sales proportion}} \right)^{\frac{1}{t}} - 1 \quad (t=\text{time in years})$$

Points are awarded to carmakers based on how their CAGRs compare to the global target rate of 70%. Carmakers that have shown growth in their CAGRs for the period 2018 to 2022 and that consistently match or outperform the global target are awarded 2 points. Falling short of this, carmakers can score a maximum of 1 point. Figure 12 in Appendix III, shows how points are calculated for this criterion.

Additionally, carmakers can earn up to 1 extra point for sector-leading growth in their proportion of ZEV sales. CAGRs that are more than two times higher than the global target afford the carmaker 1 extra point, while 0.5 points are awarded for CAGRs that are between 1.8 to 2 times higher than the global target.

It is important to note that CAGR assesses the proportion of sales rather than absolute sales, which means that a carmaker can make strides in its CAGR without reducing the number of ICE vehicles sold. Evaluation on ZEV proportions and CAGR is therefore complementary with evaluation that is based on total sales of ZEVs.

Market concentration in ICE vehicle holdout markets (5%)

This criterion scores the carmakers on the geographical distribution of their ZEV sales for the period 2020 to 2022 in ICE vehicle holdout jurisdictions. Thirteen of such jurisdictions are considered, and only cumulative ZEV sales volumes above 1,000 units per jurisdiction over the past three years are accredited. A full score of 5 points is awarded to carmakers with a cumulative ZEV sales volume between 2020 and 2022 that exceeds 1,000 units for all thirteen jurisdictions; otherwise, each jurisdiction is weighted equally at one-thirteenth. Evaluating ZEV sales performance in EV-laggard markets enables the scoring rubric to award due credit to carmakers that take part in the ZEV transition in slow-to-transform jurisdictions.

The 13 ICE vehicle holdout markets are:
Australia, Brazil, Canada, Japan, India, Indonesia, Mexico, The Philippines, South Korea, Thailand, Turkey, United States, and Vietnam.

China and the European Union are leading in ZEV sales, facilitated by fiscal or regulatory targets for ZEV adoption, representing 19% and 14% of global ZEV sales, respectively. China and the European Union are therefore not considered to be ICE vehicle holdout markets. By contrast, the United States had a ZEV penetration rate of just 6% in 2022.⁴³ This marks the United States as an ICE vehicle holdout market with a pressing need for electrification.

ICE vehicle phase-out plans (22%)

The ICE vehicle phase-out plans criterion evaluates carmakers’ publicly released targets. To ensure consistency, only commitments published on a carmaker’s official channels are evaluated. Commitments and targets must specify plans for battery electric vehicle (BEV) and fuel cell electric vehicle (FCEV) adoption and include a quantifiable reduction target and timeframe. A full score of 22 is awarded to carmakers that have committed to achieve 100% ZEV sales globally before 2030, signifying a high level of ambition to address the climate crisis.

Under this criterion, ICE phase-out plans for the big three ZEV markets — Europeⁱⁱ, the US, and China — and the rest of the world are evaluated. The scoring rubric assigns weights to each of these four geographic scopes. Scores are calculated as follows:

	Target Year		Target Area		Target ZEV percentage
Score =	Before 2030: 1.0	×	China: 0.34	×	100%: 1.0
	2030: 0.8		US: 0.17		90%: 0.9
	2035: 0.6		EU: 0.12		...
	2040: 0.3		Rest of the world: 0.37		20%: 0.2
	After 2040: 0				10%: 0.1

Renewable energy charging (5%)

Out of a maximum of 5 points, each carmaker is scored on the renewable energy charging options, programmes, and initiatives that have been implemented. The evaluation uses published materials from diverse sources. Two factors are considered:

1. **Additionality of renewable energy charging option(s):** Carmakers are rated according to the renewable energy capacity additionality of each renewable energy charging option, such as sourcing renewable energy in the local grid, or through PPAs, which would receive a higher score than purchase of unbundled renewable energy certificates (RECs).
2. **Geographical coverage:** Carmakers that provide options in more locations receive higher scores.

Final scores are calculated using the following formula:

	Additionality		Geographical coverage
Score =	Direct purchase or PPAs: 5	×	2 or more major markets: 1
	Mix of direct purchase or PPAs and unclear RECs: 3-3.5		1 major market: 0.8
	Mix of unclear RECs and other options: 2-2.5		1 or more countries or states: 0.5
	Otherwise: 0-1		Neighbourhood: 0.2
			Even more limited: 0

ii 27 European Union members and 3 European Economic Area

2.3 Supply chain decarbonisation (18%)

Scope 1 and Scope 2: Renewable energy and carbon emission reduction targets (4%)

Based on publicly released data from carmakers, emission targets for Scope 1 and Scope 2 were assessed according to the following two metrics:

1. Commitment to 100% renewable energy (3%)
2. Carbon reduction targets (1%)

A full score is awarded to carmakers that have committed to 100% renewable energy globally by 2035 with a high level of transparency on their progress and a 50% reduction in carbon emissions globally by 2030. A partial score is awarded to carmakers that have less ambitious renewable energy commitments or whose progress is unclear.

Scope 3 category 1 purchased goods and services: Emission disclosure and reduction targets (6%)

Scope 3 category 1 addresses the emissions related to a carmaker's purchased goods and services in the manufacturing process. This criterion assesses a carmaker's emission disclosures to the Carbon Disclosure Project⁴³ and publicly announced emission reduction targets in official reports. The score is distributed as follows:

1. Scope 3 category 1 emission disclosure (1%)
2. Scope 3 category 1 emission reduction targets (5%)

Carmakers that disclose their Scope 3 category 1 emissions, commit to at least a 30% reduction in their Scope 3 category 1 emissions, and have clear reduction targets outlined, are awarded the full 6 points. Carmakers with partial target information or less ambitious goals are awarded partial points, and carmakers with no mentioned goal or target receive 0 points.

Steel decarbonisation (8%)

Carmakers' steel decarbonisation efforts as a part of their Scope 3 category 1 emissions are analysed in this criterion based on the following steel-related parameters:

1. Specific targets related to steel decarbonisation and relative quality (4%)
2. Relevant investment or partnership initiatives to leapfrog technological transformation to low-carbon steel and relative quality (3%)
3. Targets for the use of secondary steel (1%)

A full score in each criterion is awarded for ambitious targets or partnership agreements with clear and quantifiable goals or supply commitments. Partial points are awarded to carmakers that have targets or partnership agreements of a lower ambition level and with unclear or unquantified goals or supply commitments. Carmakers that do not have any targets or partnership agreements in place score 0.

Deduction: SUV domination (-2%)

On average, the steel usage of SUVs is 20% higher than for other types of passenger cars. To reduce the environmental impact of steel production in the automotive sector, it is necessary that carmakers produce and sell fewer SUVs. Carmakers for which SUVs contribute more than 25% of total sales in the past five years are deducted 1 point. If the proportion of SUV sales is above 50%, 2 points are deducted.

2.4 Resource reduction and efficiency (5%)

Resource reduction and use efficiency (4%)

Material use efficiency includes both reduced consumption of raw materials and increased use of secondary materials. Carmakers are awarded 1 point each for the following criteria: 1) setting ambitious and holistic targets for the reduction of raw materials use, and 2) setting ambitious and holistic targets to increase secondary material use. An additional 1 point per criterion is awarded for a target that is quantifiable.

EV battery reuse and recycling (1%)

There is extensive potential for EV battery reuse. EV batteries that reach their end-of-life stage can be refurbished for second-life applications in energy storage.⁴⁵ EV batteries contain lithium, cobalt, nickel, manganese, and other metals and materials that are important for the automotive industry's electrification process. In light of the scarcity of many metals and minerals and the environmental impact associated with the extraction process, a circular economic model should be promoted for key materials by establishing an efficient recycling system when reuse options are not possible. Carmakers are awarded 0.5 points for investing in capacity building for EV battery reuse and recycling. Another 0.5 points are awarded if the investment or built capacity is quantifiable.

2.5 Deductions (up to 1%)

Carmakers can be deducted 0.5 points for any violation of environmental regulations or standards that occurred between August 2022 and July 2023. Carmakers can be deducted a further 0.5 points for failure to support climate policies that align with the Paris Agreement, which seeks to limit emission levels in accordance with the 1.5°C-scenario. Alignment with the terms of the Paris Agreement is indicated by LobbyMap's Automotive Climate Tool.⁴⁶ Carmakers that have been assigned scores of B- or lower by InfluenceMap in the "Performance Band" are deducted 0.5 points.

The data from LobbyMap were retrieved between June and August 2023.

3



Evaluation

In 2022, decarbonisation efforts by the world's leading traditional automakers were uneven. While some carmakers reported strong zero-emission vehicle sales numbers and others issued ambitious commitments for future decarbonisation efforts, none have published comprehensive decarbonisation strategies that reflect the urgency of the climate crisis. In general, in 2022 the world's 15 largest automakers achieved only sluggish decarbonisation efforts and targets that fell short of the ambition level needed to achieve emission reductions in line with the Paris Agreement.

3.1 Evaluation highlights

Despite rapid growth in EVs, ICE vehicles continue to dominate the global automotive market. The world's 15 largest traditional automakers sold 3.3 million sold 3.3 million ZEVs in 2022, compared to 55.5 million ICE vehicles. For traditional automakers, the portion of ICE vehicles sold each year remains high. ICE vehicles still accounted for 94.4% of total vehicles sold by the largest 15 automakers in 2022, compared to 99.5% in 2018.

Traditional automakers are losing the race when it comes to ZEV sales. While the 15 largest traditional automakers accounted for 74% of global auto market share in 2022, their ZEV market share the same year was just 43%. Traditional automakers remain focused on selling ICE vehicles while the rest of the industry has progressed towards electrification. The top 15 traditional carmakers saw a 47% growth in ZEV sales for the period 2021 to 2022, behind the global growth rate of 69% for the same period.

Global ZEV sales are on the rise, but progress has been uneven. ZEV sales for the world's 15 largest traditional automakers rose from 2.2 million units in 2021 to 3.3 million units in 2022 — an increase of more than 1 million units in one year. Five years prior, the global ZEV sales figure was only 0.4 million. However, while some traditional automakers have made relative progress in the transition toward ZEVs, others are falling far behind. In 2022, the best performing carmaker among the 15 largest traditional carmakers sold three ZEVs per ten cars sold, while the worst performing carmaker sold zero ZEVs.

Traditional automakers have failed to substantially increase ZEV sales outside China and Europe. Traditional automakers have increased ZEV sales in China and the European Union (EU), where they have benefited from government incentives, but the ZEV market penetration rate in other regions remains low. Traditional automakers continue to sell high volumes of ICE vehicles in the Global South, which perpetuates fossil fuel consumption and is inconsistent with the automakers' climate commitments.

Automakers' existing decarbonisation targets are insufficient to limit the global average temperature increase to 1.5°C. Few traditional automakers have released comprehensive sustainability plans that include targets for both the phase-out of ICE vehicles and the decarbonisation of supply chains and upstream materials. Even for automakers that received the highest scores for decarbonisation targets, their pledges fall short of the level of ambition needed to limit the global average temperature increase to 1.5°C, which, according to the International Energy Agency, requires a full phase-out of ICE vehicles by 2035.⁵ In general, in 2022 the world's 15 largest automakers achieved only sluggish decarbonisation efforts and targets that fell short of the ambition level needed to achieve emission reductions in line with the Paris Agreement.

Sports utility vehicle (SUV) sales continue to grow at an alarming rate, representing a major climate threat due to the high energy consumption of these vehicles. In 2022, 34.4 million SUVs were sold globally⁶, an increase of 1.1 million from 2021. Due to their high steel consumption and low fuel efficiency, SUVs have a higher carbon footprint than smaller-sized vehicles. Over the past three years, two-thirds of the 15 carmakers in the ranking reported increased sales of SUVs as a portion of total auto sales. In 2022, SUVs comprised more than half of global auto sales by Hyundai-Kia (53%) and Great Wall (72%), compared to 37% for Toyota, 44% for Volkswagen, 40% for General Motors, and 36% for Stellantis.

Investment in renewable energy charging by the world's biggest automakers is inadequate. As demand for electricity to power ZEVs increases, carmakers should boost renewable energy capacity to meet the additional demand. Carmakers should procure renewable energy through power purchase agreements (PPAs) and direct investment, while refraining from buying unbundled renewable energy certificates (RECs) as their renewable energy additionality is debatable.⁷

Automakers have neglected the critical role that supply chains and materials play in decarbonisation. The automakers' decarbonisation strategies tend to centre around curbing tailpipe emissions by producing and selling more ZEVs. Industry-wide, there is insufficient emphasis placed on emissions that originate from the supply chain, materials, and production, such as the energy consumed in manufacturing plants and upstream emissions from steel procurement. Ultimately, omitting to include lifecycle energy consumption for ZEVs could lead to unchecked emissions.

3.2 ICE vehicle phase-out and renewable energy charging

The tailpipe emissions of an ICE vehicle's drive phase account for the majority of the vehicle's lifetime emissions. For this reason, the phase-out of ICE vehicles and mass adoption of ZEVs are critical to reducing the industry's emissions.

ZEV sales as a percentage

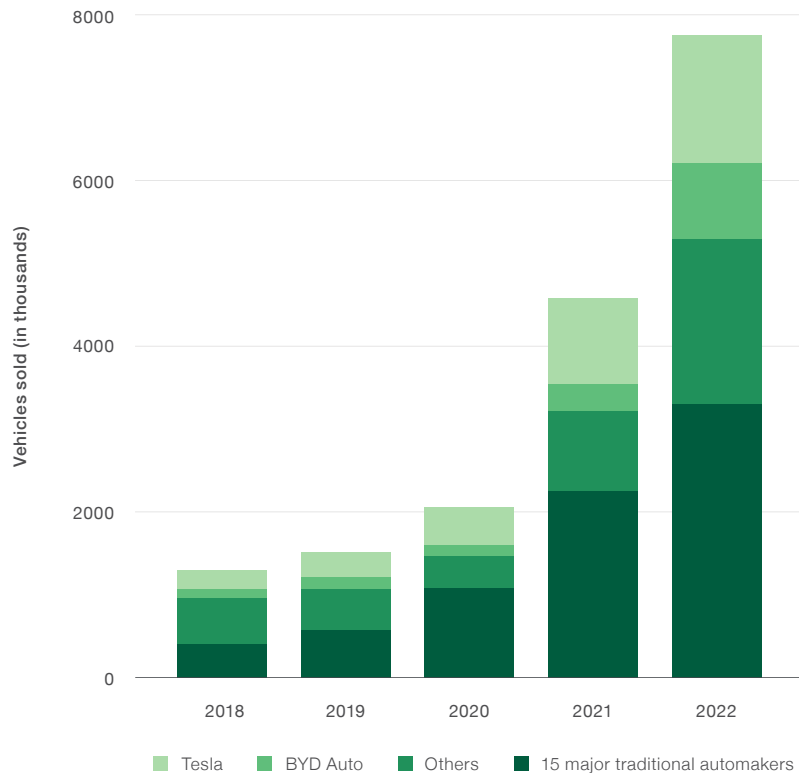
Traditional automakers are falling behind the market average in terms of ZEV sales. While the 15 largest traditional carmakers were responsible for 74% of all passenger vehicles sales in 2022, they comprised just 43% of ZEV sales in 2022, compared to 20% for Tesla and 12% for BYD. Global ZEV sales grew 69% from 2021 to 2022, but ZEV growth for the 15 largest traditional carmakers reached only 46%. See Figure 5.

In 2022, the majority of traditional carmakers reported a ZEV sales rate of less than 10%, with the exception of SAIC, BMW, Renault, and Changan. SAIC sold the most ZEVs proportionate to its total sales and was the only carmaker included in the ranking that surpassed 30% ZEV sales. Of more than 900,000 ZEVs sold by SAIC in 2022, 63% were the Wuling Hongguan Mini, a low-cost battery electric vehicle (BEV) sold exclusively in China at a starting price of 4,300 USD.ⁱⁱⁱ

Honda, Toyota, and Suzuki reported the lowest rates of ZEV sales in 2022, with ZEVs comprising less than 1% of their total sales in 2022 and for the period 2018 to 2022. The top 15 traditional carmakers saw a 47% growth in ZEV sales for the period 2021 to 2022, behind the global growth rate of 69% for the same period. As the global auto market did not experience significant overall growth during this period, the 15 major traditional carmakers lost sales to EV companies.

Figure 5.

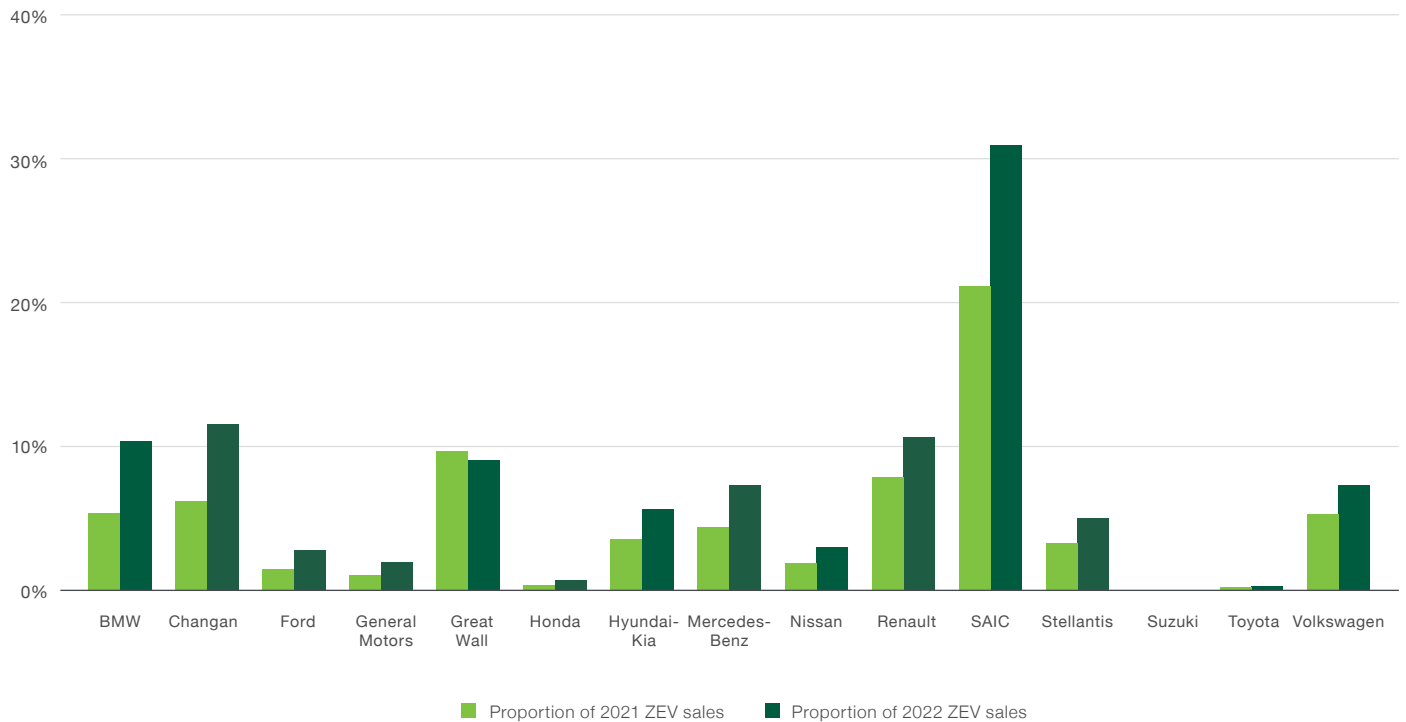
Global ZEV sales and ZEV sales by 15 major traditional automakers (Source: Greenpeace compilation based on data from Marklines)



ⁱⁱⁱ The very low cost might also contribute to an overconsumption problem. In May 2021, the Shanghai government removed the eligibility of the Wuling Hongguang Mini EV for a free New Energy Vehicle licence plate (a policy designed to fast-track the purchase of EVs), because its overwhelming sales contributed to an excess of new cars burdening the city's traffic system.

Figure 6.

Global sales of ZEVs as a percentage of total sales by company in 2021 and 2022 (Source: Greenpeace compilation based on data from Marklines)



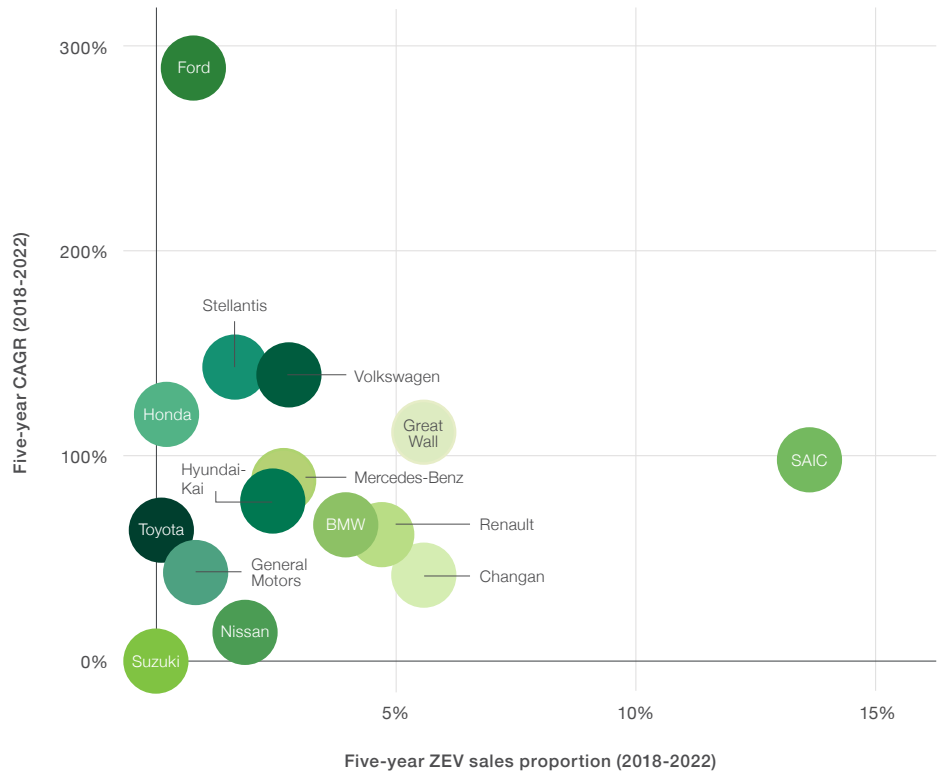
In 2022, the five-year CAGR for the 15 largest traditional automakers' ZEV sales increased by just one percentage-point, to 79.4%. The minor rise in the five-year CAGR reflects sluggish progress toward sector-wide electrification.

Of the 15 automakers, those that achieved CAGR values exceeding 100% were Ford, Stellantis, Volkswagen, Honda, and Great Wall. Their ZEV sales growth over the past five years demonstrated positive progress towards electrification, although their overall ZEV sales numbers remained low. Ford and Honda's high CAGR values are attributable to their low ZEV sales proportions in 2018, at 0.013% and 0.030% respectively, allowing them a greater opportunity for sharp growth.

Of the 15 automakers, General Motors, Nissan, Toyota, and Suzuki reported both the lowest ZEV sales as a percentage of total sales and the lowest ZEV sales growth rate. Suzuki did not sell any ZEVs in 2022. Despite Nissan's early adoption of BEVs with the Leaf, the automaker reported the second lowest growth rate over the past five years. See Figure 7.

Figure 7.

CAGR and ZEV sales proportion for the period 2018 to 2022 (Source: Greenpeace compilation based on data from Marklines).



Sales of ZEVs in ICE vehicle holdout markets

In the ranking, carmakers are rewarded for ZEV sales in ICE vehicle holdout markets, which are defined as jurisdictions that have not made significant regulatory strides in facilitating or mandating the phasing-out of ICE vehicles, or where ZEVs have a small presence. Please refer to the Methodology section for details.

BMW and Volkswagen have the broadest market coverage, and each sold more than 1,000 ZEVs in six ICE vehicle holdout jurisdictions between 2020 and 2022. Hyundai-Kia and Mercedes-Benz are the runners-up in this category, and each reported ZEV sales figures of above 1,000 units in five ICE vehicle holdout jurisdictions between 2020 and 2022. All four automakers reported significant sales numbers in South Korea and the US.

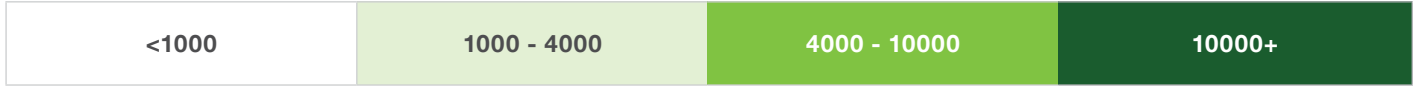
Nissan achieved a modest score in this category, with ZEV sales exceeding 1,000 units over the past three years in four ICE vehicle holdout markets. Its sales were especially concentrated in Japan and the US. Ford and General Motors' ZEV sales in ICE vehicle holdout jurisdictions were heavily concentrated in North America.

The 15 automakers sold few ZEVs in Brazil, Mexico, The Philippines, and Vietnam. Of the 15 carmakers, SAIC is the only one that reported sizable ZEV sales in India, Thailand, and Indonesia.

Figure 8.

ZEV sales in 13 ICE vehicle holdout markets by the 15 automakers from 2020 to 2022.

The following colour gradient represents the number of ZEVs sold by the automakers in each ICE vehicle holdout market.



	Australia	Brazil	Canada	India	Indonesia	Japan	South Korea	Mexico	Philippines	Thailand	Turkey	US	Vietnam
BMW													
Changan													
Ford													
General Motors													
Great Wall													
Honda													
Hyundai-Kia													
Mercedes-Benz													
Nissan													
Renault													
SAIC													
Stellantis													
Suzuki													
Toyota													
Volkswagen													

Figure 9.

Total sales and ZEV sales by region (China, US, EU, Japan, South Korea, or other) for each automaker in 2022 (Source: Greenpeace compilation based on data from Marklines).



A number of automakers show inconsistent market distribution when it comes to ZEV sales.

Figure 9 shows the difference in market distribution for automakers' total and ZEV sales in 2022. Honda's ZEV sales were concentrated in China and constituted 90% of its ZEV sales, which were double its overall sales distribution in the same market, at 37%. One third of Renault's overall sales were concentrated in markets outside of China, the US, the EU, Japan, and South Korea, but Renault's ZEV sales in these markets were minimal. Stellantis' ZEV sales in markets outside of China, the US, the EU, Japan, and South Korea were also proportionally smaller than its ICE vehicle sales in these markets. More than one-third of Hyundai-Kia's overall sales occurred in markets outside of China, the US, the EU, Japan, and South Korea, but its share of ZEV sales in these markets was minimal.

The EU is a major ZEV market for many automakers, including those that sell relatively few vehicles in the EU, such as Hyundai-Kia, Nissan, and Toyota.

Targets and commitments to phase out ICE vehicles

Ford, General Motors, and Mercedes-Benz are all signatories of the COP26 Declaration on ZEVs and received 1st place in the "Targets and commitments to phase out ICE vehicles" criterion of our ranking. The COP26 Declaration on ZEVs stipulates a full ICE phase-out in Europe, the US, and China by 2035, and globally by 2040.⁴⁷ Despite low ZEV sales and late phase-out dates, Honda's ICE vehicles phase-out commitments in Europe, the US, China, and globally earned it 4th place in the ranking.

Aside from the four companies listed above, the remaining companies included in the ranking have not established any ICE vehicle phase-out dates. BMW placed 5th in the commitments category, as the automaker's ICE phase-out plans have global reach and explicitly mention targets for the European, Chinese, and US markets. BMW aims for ZEVs to comprise 50% of its total auto sales by 2030.⁴⁸ Toyota, Hyundai-Kia, and Stellantis' ICE vehicle phase-out commitments are unambitious. Toyota has not issued an ICE phase-out date, and has instead set a target to sell 3.5 million ZEVs^{iv} annually by 2030.⁴⁹ Hyundai and Kia's global 2030 ZEV sales targets of 34% and 37%, respectively, do not include any roadmaps toward complete ICE phase-outs.^{50,51} Stellantis has committed to a full ICE phase-out in Europe and a ZEV sales targets of 60% in China by 2030, accompanied by a goal for half of all light-duty trucks sales in the US to be ZEVs by 2030.⁵² As some of the largest companies in the automotive sector, the performance of Toyota, Hyundai-Kia, and Stellantis is behind expectations.

The four lowest scoring carmakers that have issued some type of ICE phase-out targets are Volkswagen, Nissan, Renault, and Suzuki. Volkswagen has not issued a full ICE phase-out goal but instead targets ZEV sales to reach 60% in Europe and 50% globally by 2030. Renault only has plans to phase out ICE vehicle sales in the European market, where a mandatory ban on ICE vehicles will soon go into effect. Nissan has only issued a ZEV sales target in the US of 40% by 2030. Suzuki has issued targets for Europe, Japan, and India, but Suzuki's targets are relatively unambitious compared to its peers. Nissan made an announcement in September 2023 to "achieve 100% EV in Europe by 2030", the company then confirmed upon Greenpeace's inquiry that they are committed to phasing out ICE and e-POWER hybrids vehicles in Europe by 2030. This signifies a more progressive approach by the company.⁵³

Despite their relatively high portion of ZEV sales as a percentage, Changan, Great Wall, and SAIC achieved a score of 0 in the commitments category. None of the companies have released any ICE vehicle phase-out targets or commitments. SAIC and Great Wall have only targeted to sell 32% and 80% new energy vehicles (NEVs) by 2025, respectively, and Changan aims for NEVs to reach 60% of its sales in China by 2030.^{54,55,56} However, as NEVs include tailpipe emission-emitting PHEVs, these targets are not considered to be ICE phase-out targets.

Overall progress by traditional automakers to issue ICE phase-out targets can be best described as lacklustre. Few automakers issued new targets in 2022, and the majority of carmakers have only issued ICE vehicle phase-out plans for a few select markets without committing to a global phase-out.

iv Toyota's ICE phase-out pledge is articulated as 3.5 million ZEVs sold annually by 2030. Assuming no growth in total sales volume between 2022 and 2030, it translates to a ZEV proportion of 35.9% globally in 2030.

Renewable energy charging

ZEVs are only truly zero-carbon in the drive phase if the electricity that powers them is produced by renewable sources.^{11,12} Burning fossil fuels to produce electricity that is used to charge ZEVs is a carbon-emitting practice.^{57,58} As the world's ZEV fleet grows, the additional electricity demand from EVs needs to be met by renewable energy. The importance of scaling up the charging infrastructure that supplies electricity from renewable sources cannot be overstated.⁵⁹

Most of the 15 automakers provide renewable energy charging options, or have at least announced the ambition to do so. Most carmakers provide this service through partnerships with charging companies – often with the same few companies – and these renewable energy charging options are indeed those with the widest geographical coverage.

Some charging companies that carmakers have partnered with claim to offer zero-carbon energy through the purchase of renewable energy certificates (RECs) with unclear sources. The lack of direct purchase of renewable energy and the poor traceability of RECs are ongoing problems. How much these RECs truly contribute to the additionality of renewable energy generation is debatable.⁷

Mercedes-Benz, Hyundai-Kia, and BMW received the highest scores in renewable energy charging. All three automakers have partnered with charging companies to build charging networks which they claim provide zero-carbon electricity with wide geographical coverage. However, the use of RECs from unclear sources casts doubt on the networks' additionality contribution to overall renewable energy capacity. Some of the charging options provided by Volkswagen offer better renewable energy additionality due to their clearly delineated sources of renewable energy, however the scale of those is limited.

3.3 Supply chain decarbonisation

As a part of the decarbonisation process, automakers must address emissions from purchased goods and services, as well as electricity used in their production process. As an important source of emissions, carmakers need to take steps to ensure that their manufacturing processes move towards carbon neutrality.

Scope 1 and Scope 2 emissions: Renewable energy and carbon reduction targets

Scope 1 and Scope 2 emissions refer to greenhouse gas emissions that are either from sources in direct control or ownership of the carmakers, or related to the carmakers' energy usage through their purchase of electricity, cooling, heat, and steam.

For many industries, the adoption of renewable energy has been central to decarbonisation efforts, but the auto industry lags in this regard. Six carmakers – BMW, Ford, General Motors, Mercedes-Benz, Stellantis, and Volkswagen – have committed to or have already achieved the transition to 100% renewable energy in their own operations globally by 2035 or earlier, and have committed to reduce carbon emissions globally by at least half by 2030 or earlier. However, of note, some companies continue to rely heavily on offsets, reducing the impact of these projects.

Honda and Toyota's commitment to using 100% renewable energy at their US manufacturing sites by 2030 is a promising development, but it needs to be scaled up globally.^{60,61} Renault's pledge to use 70% renewable energy by 2030 has an appropriate short-term timeline but lacks a roadmap towards 100% renewable energy consumption.⁶² The targets set by Hyundai-Kia and Nissan are unambitious, as outlined on Appendix III, Table 1.

Volkswagen has improved its carbon reduction targets from 30% reduction in production-related carbon emissions to 50%, matching the carbon reduction goal of Mercedes-Benz. Renault aims to halve its emissions at its own sites by 2030. By 2035, General Motors and Ford aim to reduce their Scope 1 and 2 operations emissions by 72% and 76%, respectively, compared to a 2018 (for General Motors) and 2017 (Ford) baseline. BMW stands out for its relatively progressive carbon reduction plan. The German carmaker aims to reduce its Scope 1 and Scope 2 emissions 80% by 2030 against a 2019 baseline, representing one of the most ambitious short-term timelines. By contrast, Honda, Nissan, and Hyundai-Kia have clear yet unambitious Scope 1 and Scope 2 carbon reduction targets, while Suzuki, SAIC, and Great Wall do not provide a roadmap alongside their vague goals.

Reducing the carbon emissions and energy use of the automotive industry's own sites is both necessary and attainable, and all carmakers need to strive towards targeted reductions with a clear roadmap. Without a clear roadmap to net zero, the automotive industry's reductions risk being offset by the increase in production volume. Additionally, carmakers must decarbonise their purchased goods and services. This part reaches far and wide; first and foremost, the focus and effort should be put into the carbon-intensive sectors – steel and batteries.

Scope 3 purchased goods and services: Disclosure and reduction targets

12 out of the 15 automakers report and disclose their Scope 3 purchased goods and services emissions data. Emissions data for Changan, Great Wall, and SAIC are unavailable.

However, even for the automakers that disclose Scope 3 purchased goods and services emissions data, the quality of the data varies. Only a few companies state that they collect primary emissions data from their suppliers. Carmakers that do not collect primary emissions data from their suppliers probably use industry average emissions factors, but without a standardised set of emissions factors, the comparability of the companies' practices and their impact on emissions figures is potentially low.

Of the 15 automakers, Mercedes-Benz and Stellantis have the most progressive targets and scored the highest in this criterion, though the extent of the use of offsets to achieve these targets is not clear. Mercedes-Benz plans to reduce its carbon footprint from materials, with targets of sourcing only carbon neutral materials on the balance sheet from 2039.⁶³ Stellantis also claims that it will be carbon neutral from “well to wheel” and throughout its supply chain by 2038.⁶⁴ Renault and BMW achieve joint 2nd place in this criterion for having a clear target of reducing their Scope 3 Upstream emissions by 30% by 2030 (no baseline given) and 20% by 2030 (compared to a 2019 baseline), respectively.^{62,65}

General Motors and Ford both claim to have plans to achieve carbon neutrality in their supply chain by 2038 and 2050, respectively.^{66,67} Their plans aim to reduce carbon emission from Scope 3 Upstream through systemic engagement with suppliers, however the roadmaps are unclear. Ford's timeline needs to be more progressive.

Hyundai and Kia have different plans for Scope 3 purchased goods and services emissions reduction. Hyundai's reduction target in the 2021 Auto Environmental Guide⁴² was unambitious and aimed for 10% reduction by 2035. There is no mention of this target in Hyundai's latest official report, and it is unclear if the target has been abandoned or reformulated. Hyundai stated that carbon neutrality would be achieved by 2045, including its supply chain. Kia's target in its core materials previously was a 50% carbon reduction by 2030, but in the latest documents, a far less ambitious target of a 10% reduction in carbon emissions by 2030 was published, with the aim of achieving over 90% carbon neutrality by 2045.⁶⁸

Toyota has announced its target to reduce emissions throughout the entire vehicle lifecycle by 30% by 2030, and eventually reaching a 100% reduction in 2050.⁶⁷ Toyota's 2030 interim target applies to emissions consumed by the Toyota Motor Corporation, emissions from “corporate activities” and emissions from “suppliers and customers”, and not just Scope 3 purchased goods and services related emissions. Toyota's target lacks clarity about the short-term timeline and concrete steps that will be taken to reach them.⁶⁹

The remaining companies have not issued meaningful pledges for the reduction of Scope 3 purchased goods and services emissions.

Scope 3 Upstream carbon reduction can be challenging. However, given that it is a carbon-intensive portion of a vehicle's life cycle emissions, all major carmakers need to take effective actions to reduce their purchased goods and services carbon footprint.

Steel decarbonisation

The quality of steel decarbonisation efforts varies across carmakers. It ranges from the better-performing carmakers that spotlight the issue in official statements and reports accompanied by concrete targets and goals, to the worst performing carmakers that fail to acknowledge the issue in any meaningful way.

BMW, General Motors, Ford, and Mercedes-Benz are the best performing carmakers and have issued pledges to switch a portion of their steel consumption to low-carbon steel. Their commitments to steel decarbonisation are reinforced by a series of partnership projects with low-carbon producers. Ford and General Motors are among the few carmakers with the modest low-carbon steel procurement target of minimum 10% low-carbon steel, and other carmakers should follow suit.

Stellantis and Hyundai-Kia's performance in steel decarbonisation is mixed. Stellantis has targeted to meet 25% of its steel consumption with low-carbon steel by 2025 – one of the most ambitious short-term timelines for steel decarbonisation among the top 15 carmakers. Hyundai-Kia is recognised for its steel consumption volume disclosure and its quantification of the use of secondary metals. Hyundai-Kia's partnership with POSCO to produce low-carbon steel through direct reduced iron (DRI) process with green hydrogen marks the carmaker as the forerunner of steel decarbonisation in East Asia, although Hyundai-Kia has not disclosed any information about the supply timeline and volume.

Only BMW, Ford, and General Motors have set targets explicitly around the use of secondary steel.

No carmaker has disclosed the carbon footprint of its steel consumption, and all the major carmakers lack concrete roadmaps towards complete decarbonisation of their steel purchases. Establishing partnerships with low-carbon steel producers is a good first step, but the carmakers should take steps to audit their suppliers and disclose their emissions from steel procurement. At the same time, issuing ambitious zero-carbon steel procurement commitments would encourage the steel industry to invest in the technological transition.

SUV proportions and total number

While all conventional ICE vehicles are environmentally damaging, the impact of SUVs on the environment is particularly damning due to their comparatively high material usage and low miles-per-gallon performance. Compared to smaller-size passenger vehicles, SUVs use 20% more steel, primarily due to their heavy frames.⁷⁰ Efforts to reduce the environmental impact of steel production need to not only focus on decarbonising the manufacturing process but also reducing the amount of steel used. In the automotive industry, the latter necessitates a reduction in the number of SUVs. The poor aerodynamics and heavy weight of SUVs also contribute to a high consumption of fuel and energy.

The automotive industry needs a targeted reduction in the number of SUV sales to address greenhouse gas emissions from steel and fuel. Increasing the sales of SUVs can countervail or even nullify the averted emission from ZEV sales.

In general, SUV sales are on an unhealthy and unsustainable upwards trajectory. SUV sales in 2022 accounted for more than 40% of total sales for the 15 major carmakers, a sharp increase from 30.6% just five years prior. When we look at individual companies, Hyundai-Kia and Volkswagen's SUV sales proportions have skyrocketed in recent years with an increase of more than 18 percentage-points for the five-year period ending in 2022. Most companies rely on SUVs for more than 30% of their sales, but none are as pronounced as Great Wall (72%) and Hyundai-Kia (53%).

Suzuki is a noteworthy exception and the only carmaker that is not deducted points in this criterion. Suzuki's five-year SUV proportion is 20.38% – unsurprising for a carmaker that has a design philosophy around small vehicles.

Figure 10.

SUV percentage of total vehicles sales in 2022 (Source: Greenpeace compilation based on data from Marklines).

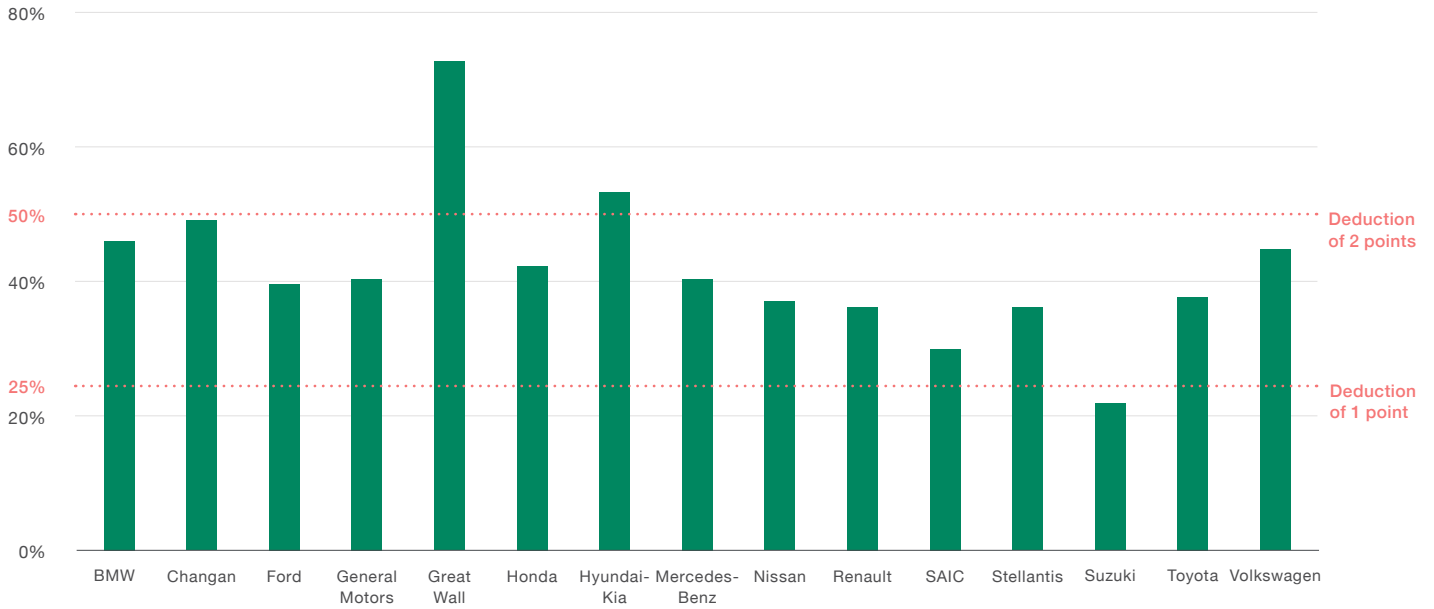
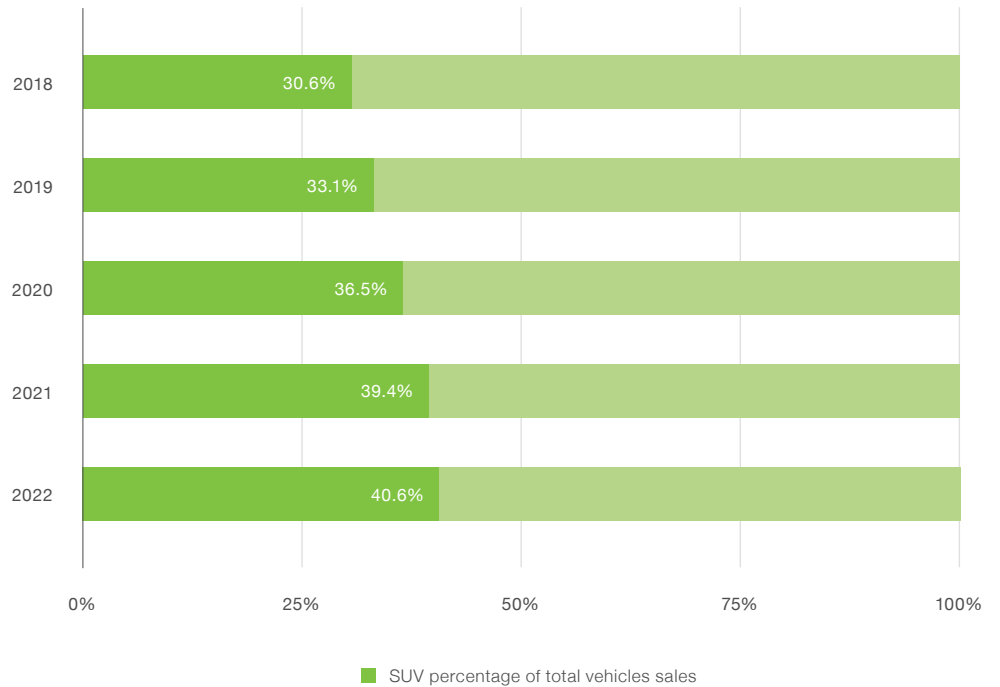


Figure 11.

SUV percentage of total vehicles sales by the 15 automakers in 2018-2022 (Source: Greenpeace compilation based on data from Marklines).



3. Evaluation

3.4 Resource reduction and efficiency

Recycling materials in a closed-loop system in which they are reclaimed, reprocessed, and repurposed will mean fewer virgin metals and minerals need to be extracted from our planet to sustain the automotive industry. It is pivotal that carmakers take action to account for the types and quantities of materials that go into the car manufacturing process. Some of these materials, such as steel, are environmentally costly to produce, and others, such as critical minerals used in ZEV batteries, can have environmentally and socially harmful extraction processes. The automotive industry needs to reduce the use of raw materials; increase its use of secondary, recycled materials; and invest in building capacity to reuse and recycle ZEV batteries.

Disappointingly, there has been miniscule improvement in carmakers' resource use efficiency targets in the past year. Nissan is the only carmaker with tangible targets for reducing its raw materials consumption. Nissan aims for materials that are not made from newly mined resources to account for 70% of material use in each vehicle by 2050. As of 2023, General Motors uses secondary or recycled steel from Nucor Corp. and US Steel, albeit with no clear scale of supply.

An EV battery is estimated to maintain roughly 80% of its original capacity when it is decommissioned.⁷¹ Even though this capacity might be inadequate for the use of EVs, it can still be used in less demanding operations such as stationary energy storage.⁷² All carmakers except Changan, Great Wall, and SAIC have demonstrated some level of initiative or effort in investing in various solutions for the reuse and/or recycling of decommissioned EV batteries. Most carmakers now have various recycling schemes in place to extract critical minerals and other metals from EV batteries, but the sector's reuse solutions are generally inadequate. Mercedes-Benz, Renault, and Toyota have the strongest performance in this category as their initiatives combine a focus on the reuse of EV batteries for energy storage purposes with an explicit priority of reuse over recycling and, most importantly, an aim to reach a large scale of energy storage. All three are building energy storage systems with a capacity upwards of 80 megawatt-hours (MWh). Volkswagen's target to recycle 3,600 EV batteries per year in the scheme's pilot stage is also noteworthy.

3.5 Negative climate lobbying and violations of environmental regulations

None of the major carmakers shows a satisfactory level of engagement with the climate emergency, and engagement on climate policy ranged from lack of participation to active policy obstruction. InfluenceMap scores the carmakers on a scale of A+ to F, where A+ represents a top level of support for climate policies. According to InfluenceMap's assessment, the engagement intensity of all carmakers besides Stellantis, Renault, and Toyota is graded between C and D+.⁷³

Stellantis, Renault, and Toyota received the lowest grade of D among the top 15 carmakers. Toyota has been actively engaged with a variety of climate policy streams globally between 2021 and 2023 with mostly negative lobbying.⁷⁴ Renault appears to have continuously advocated for a delay to the EU's 2035 zero-emissions CO₂ target

to promote a longer-term role of ICE-powered hybrid vehicles.⁷⁵ Stellantis appears to be engaging increasingly positively on the UK's ZEV mandate and California's Advanced Clean Cars II rule, while appearing opposed to the EU's zero-emission CO₂ targets for cars and vans.⁷⁶

General Motors and Stellantis are deducted 0.5 points for environmental violations between August 2022 and July 2023. General Motors and Stellantis were fined a combined \$363,800,000 for failing to meet fuel economy standards in the US.⁷⁷

Glossary

Terms

B	BEV	Battery electric vehicle
C	CAGR	Compound annual growth rate
	COP26	The 26th Conference of the Parties (The United Nations Climate Change Conference held in Glasgow in 2021)
E	EU	The 27 European Union members and 3 European Economic Area
	EV	Electric vehicle
F	FCEV	Fuel cell electric vehicle
H	HEV	Hybrid electric vehicle
I	ICCT	International Council on Clean Transportation
	ICE	Internal combustion engine
	IEA	International Energy Agency
N	NEV	New energy vehicle
P	PHEV	Plug-in hybrid electric vehicle
	PPAs	Power purchase agreements
R	RECs	Renewable energy certificates
S	SUV	Sports utility vehicle
U	US	The United States
Z	ZEV	Zero-emission vehicle

Definitions

Additionality	Additionality is the property of an activity being additional. In this report, it refers to being additional to the overall renewable energy capacity. A proposed activity is additional if the recognised interventions are deemed to be causing the activity to take place. The occurrence of additionality is determined by assessing whether a proposed activity is distinct from its baseline.
BEV	Battery electric vehicle. A vehicle without fuel tank or exhaust pipe and relying only on electricity for propulsion, a kind of non-internal combustion engine vehicle.
EV	Electric vehicle. A vehicle fully or partially powered by electricity.
FCEV	Fuel cell electric vehicle. A vehicle using a fuel-cell and powered by compressed liquid hydrogen.
HEV	Hybrid electric vehicle. A vehicle with small battery assisting the engine, a kind of ICE vehicle.
NEV	New energy vehicle. A term used in China to represent BEV and PHEV.
PHEV	Plug-in hybrid vehicle. A vehicle powered by both gasoline and electricity, a kind of ICE vehicle.
Secondary steel	Secondary steel is produced by remelting post-consumer steel or steel scrap that is left over from production manufacturing.
ZEV	Zero-emission vehicle. An electric vehicle that does not produce exhaust emissions that release pollutants or carbon when it operates. In this report, only BEV and FCEV are regarded as ZEV. PHEV is not considered a ZEV.



Appendices

Appendix I: Company profiles

Company profile: BMW

2022 Market Share: 2.76%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
40.0	25.0	13.0	2.5	-0.5

Percentage of ZEV sales in 2022: 10.32%

General Profile

Compared to its low 2018 ZEV sales proportion of 1.40% just five years ago, BMW is on a promising upward trajectory towards electrification that is underscored by its accelerating ZEV sales proportion in the past two years. BMW's ZEV sales proportion in 2022 reached 10.32%.

BMW has released appropriate targets in adopting renewable energy at its own sites and in carbon reduction, and showcases a relatively high level of transparency in its carbon emissions and reduction target disclosures on various platforms. Its steel decarbonisation commitments stand out in a sea of laggards that fail to adequately address the issue, and the carmaker is noted for having targets to increase the use of secondary steel. Its material use reduction and efficiency targets are likewise appropriate, although it does not sufficiently address if it will make tangible targets in reducing raw material consumption.

BMW performs consistently well across all criteria, earning it a 2nd place in its debuting year in the ranking guide. Its performance is indicative of a well-rounded sustainability profile that combines a demonstrable effort to ramp up ZEV sales in its key markets with electrification and decarbonisation targets as well as commitments across the parameters that are assessed in this guide. One area in which BMW falls behind is its ICE phase-out plans; the carmaker should commit to a clear timeline towards 100% ZEV sales.

Phase-out of ICE vehicles		subscore
ZEVs made up 10.32% of BMW's total sales in 2022 and 4.11% between 2018 and 2022. BMW's sales performance for ZEVs prior to 2021 was modest but the total ZEV sales numbers took off in 2021 and 2022 with a year-to-year increase of 3.15 and 1.88-fold, respectively.	Percentage of ZEV sales (2022)	8.60
	Percentage of ZEV sales (2018-2022)	2.80
	CAGR for ZEV sales (2018-2022)	0
BMW sold relatively more ZEVs in the ICE vehicle holdout markets than its counterparts. Although more than half of BMW's ZEV sales are in Europe and around one-third in China, BMW sold more than a thousand ZEVs in the US and South Korea, and some in Turkey, Canada, Japan, and Mexico in the past three years.	Market concentration in ICE vehicle holdout markets	2.31

Phase-out of ICE vehicles		
BMW has committed 50% of its sales to be ZEVs by 2030, with MINI and Rolls-Royce expected to be fully electric by 2030. ⁴⁸ The company expects a quarter of its total sales to comprise ZEVs by 2025, and one-third by 2026. ⁷⁸ BMW's target sets it apart from its peers for its early timeline and stands in contrast to other carmakers that have commitments for 2035 or later. BMW has not committed to a complete phase-out of ICE vehicles, and its current target lacks long-term ambition. ⁶⁵	ICE vehicles phase-out plan	8.80
BMW participates in the ChargeNow and IONITY public charging networks that operate renewable energy charging points throughout Europe, mainly through unclear offset schemes combined with direct purchase at a small scale. ^{79,80}	Renewable energy charging	2.50
Supply chain decarbonisation		
Scope 1 and 2		
BMW is committed to an average of 80% carbon reduction per vehicle produced in Scope 1 and Scope 2 by 2030 against a base year of 2019. BMW has sourced all of its external electricity from renewable energies since July 2020. ⁶⁵	Renewable energy commitments	3
	Carbon reduction targets	1
Scope 3: purchased goods and services		
BMW has disclosed its Scope 3 purchased goods and services emissions data in its official report and on the Carbon Disclosure Project (CDP) database. The company aims to reduce carbon emissions by over 20% per vehicle on average in the supply chain (Scope 3's upstream sector) by 2030, based on a 2019 baseline. ⁶⁵	Disclosure and targets	4
BMW aims to use more than a third of "CO ₂ -reduced" steel by 2026. ⁸¹ The company has invested in low-carbon or even zero-carbon steel, having partnered with Boston Metal ⁸² , H2 Green Steel ⁸³ and Salzgitter AG ⁸⁴ . The company also claims that these agreements can contribute to the production of low-carbon steel that will meet over 40% of the steel demand in European plants, reducing CO ₂ emissions by up to 400,000 tonnes per year. ⁸⁵ However, the company does not have clear targets for steel decarbonisation. BMW has disclosed that steel and iron account for 48.7% of total material use, but has not disclosed the exact amount. The BMW Group plans to gradually increase the percentage of secondary steel, reaching up to 50% by 2030. ⁸⁵	Steel decarbonisation	6
The share of SUVs in BMW's total sales in 2022 is approximately 46%, and this proportion has been consistently increasing over the past five years.	SUV share	-1
Resource reduction and efficiency		
BMW has not set any specific targets to reduce its overall use of raw materials.	Targets on raw material reduction	0.0
The company's vehicles currently consist of up to 30% recycled and reused materials, and it plans to increase the number to 50% through its "Secondary First" approach. ⁸⁶ The 50% target does not have a timeline.	Secondary material usage	2.0
BMW Group UK said it would supply Off Grid Energy with retired battery modules that can be adapted into mobile power units. ⁸⁷	EV batteries – reuse and recycling	0.5
Deductions		
BMW received a score of D+ by LobbyMap. ⁸⁸	Negative climate lobbying	-0.5

Company profile: Changan

2022 Market Share: 2.24%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
12.5	13.5	-1.0	0.0	-0.0

Percentage of ZEV sales in 2022: 11.52%

General Profile

Changan ranks towards the lower end of the chart. Changan's ICE phase-out performance is modest and its sales are still driven by ICE vehicles, although over the past two years the increase in ZEV sales is instead of are indicative of a promising trend towards electrification that needs to be kept up. The carmaker has committed to carbon neutrality by 2045; although it is a good first step, the lax timeline lacks ambition and the target year needs to be pushed forward.

Changan has not issued any targets or goals for renewable energy adoption, Scope 3 decarbonisation, steel decarbonisation, or reduction of material consumption. Changan has not made disclosures about its emissions or carbon reduction targets either. Due to a lack of data, Changan is not assessed on its engagement with climate policies.

Changan has a weak sustainability profile and needs to address supply chain and purchased goods decarbonisation, and articulate a more ambitious roadmap towards a full ICE phase-out.

Phase-out of ICE vehicles		subscore
Changan sold 204,750 ZEVs in 2022. Changan's ZEV proportion in 2022 was 11.52%, nearly double its 2021 ZEV proportion of 6.13%. Over the past five years, 5.80% of its total sales comprised of ZEVs. Changan is a late transitioner towards electrification and its ZEV sales have grown at a promising rate from 2020. It attained a subpar CAGR of 40.85% and needs to keep up the momentum and ramp up its ZEV sales further.	Percentage of ZEV sales (2022)	9.60
	Percentage of ZEV sales (2018-2022)	3.94
	CAGR for ZEV sales (2018-2022)	0
Changan's ZEV sales in ICE vehicle holdout jurisdictions are negligible.	Market concentration in ICE vehicle holdout markets	0
Changan has pledged to be carbon neutral by 2045 but has not announced any plans to phase out ICE vehicles, earning the carmaker a score of 0. ⁸⁹	ICE vehicles phase-out plan	0
Changan does not have a renewable energy charging option.	Renewable energy charging	0

Supply chain decarbonisation		
Scope 1 and 2		
Changan has not disclosed any information on renewable energy targets. As for carbon reduction targets, Changan has stated a commitment to attaining 30% carbon reduction by 2030 compared to 2020. ⁹⁰	Renewable energy commitments	0
	Carbon reduction targets	0
Supply chain decarbonisation		
Scope 3: purchased goods and services		
Changan has not released any information on this scoring criterion.	Disclosure and targets	0
Changan has not released any information on this scoring criterion.	Steel decarbonisation	0
SUVs comprised 49% of Changan's total sales in 2022, the third highest of the fifteen companies.	SUV share	-1
Resource reduction and efficiency		
Changan has not released any information on this scoring criterion.	Targets on raw material reduction	0
Changan has not released any information on this scoring criterion.	Secondary material usage	0
Changan has not released any information on this scoring criterion.	EV batteries – reuse and recycling	0
Deductions		
No available data on Changan's engagement with climate policies could be referred to.	Negative climate lobbying	N/A

Company profile: Ford

2022 Market Share: 4.72%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
28.9	18.9	10.0	0.5	-0.5

Percentage of ZEV sales in 2022: 2.74%

General Profile

Ford's ICE vehicle phase-out performance is poor. Although Ford sold more than 100,000 ZEVs in 2022, its ZEV sales proportion is less than 3%. When looking at the past five years, the ZEV sales proportion is less than 1% despite Ford's position as an early adopter of EV technology. The high CAGR score that Ford attained is due to its abysmal sales numbers in 2018 and 2019, allowing for a high growth that did not correspond with a high ZEV sales volume. Ford is a signatory of the COP26 pledge and has appropriate ICE vehicles phase-out commitments.

Ford has made appropriate Scope 1 and Scope 2 decarbonisation targets in line with expectations for the automotive industry. The carmaker has disclosed its emissions to the Carbon Disclosure Project but has not disclosed any clear carbon reduction targets for Scope 3 purchased goods and services. Likewise, Ford's steel decarbonisation commitments overall mark it as one of the better carmakers in this criterion, and the carmaker stands out for having targets to increase the use of secondary steel. Its material use reduction and efficiency targets are adequate for secondary materials but it should adopt clear and quantifiable targets for its consumption of raw materials. It is further deducted 0.5 points for its failure to engage with climate policies.

Overall, Ford's performance in decarbonising its supply chain is inconsistent and needs to be improved. Ford needs to ramp up its ZEV sales urgently.

Phase-out of ICE vehicles		subscore
Ford's ZEV sales have witnessed a drastic rise in the past five years, from a mere 711 ZEVs sold in 2018 to 102,666 units sold in 2022. The total ZEVs sold in 2022 nearly doubled from 2021. The five-year CAGR is 282.76%, up from 161.63% in last year's assessment and the highest among the carmakers in this guide. Despite the promising figures from total sales and CAGR, Ford's ZEV proportion was a mere 2.74% in 2022. Although it has increased from 1.40% in 2021, it is still remarkably low and needs to be improved.	Percentage of ZEV sales (2022)	2.28
	Percentage of ZEV sales (2018-2022)	0.48
	CAGR for ZEV sales (2018-2022)	3
Ford scored relatively low in this category. Although Ford sold a relatively high number of ZEVs in the US and Canada, it pales in comparison to its peers when it comes to sales in ICE vehicle holdout markets.	Market concentration in ICE vehicle holdout markets	0.77
Ford is a COP26 signatory and has pledged to achieve a complete phase-out of ICE vehicles in Europe, the US, and China by 2035, and globally by 2040. ⁹¹ It is among the more ambitious carmakers.	ICE vehicles phase-out plan	10.76
Ford is a part of the IONITY joint venture that operates renewable energy charging points throughout Europe. ⁷⁹ Ford also offers a home charging option in California. ⁹²	Renewable energy charging	1.60

Supply chain decarbonisation		
Scope 1 and 2		
Ford has pledged to decrease its absolute Scope 1 and Scope 2 greenhouse gas (GHG) emissions by 76% by 2035, from the base year of 2017. In addition, the company has committed to using 100% renewable energy by 2035. ⁹³	Renewable energy commitments	3
	Carbon reduction targets	1
Scope 3: purchased goods and services		
Ford has disclosed its Scope 3 purchased goods and services emissions data in its official report and on the CDP database ⁹³ . Although the company has set a carbon neutrality by 2050 target that includes its supply chain emissions, it is not ambitious enough without a specific roadmap for Scope 3 purchased goods and services targets. ⁹³	Disclosure and targets	1
Ford joined the First Movers Coalition in 2022 and has pledged to procure a minimum of 10% carbon neutral steel by 2030. ⁴¹ Additionally, the company is expected to increase its use of secondary steel in line with the Coalition's collective target of emitting less than 0.1 tonnes of emissions per tonne of crude steel produced with 100% input of secondary steel. ⁹⁴ The company has signed a contract with Tata Steel Nederland B.V., Salzgitter Flachstahl GmbH, and ThyssenKrupp Steel Europe AG for the supply of low-carbon steel in Europe. ^{95,96,97}	Steel decarbonisation	6
SUVs constituted 39% of Ford's total sales in 2022, and this figure has been consistently increasing for the past five years.	SUV share	-1
Resource reduction and efficiency		
Ford has not established any particular objectives to decrease its overall consumption of raw materials. Apart from that, it highlights the importance of responsible sourcing of raw materials through the supply chain using a due-diligence programme. ⁹³	Targets on raw material reduction	0
Ford has presented an official report with a plan for aluminium recycling. However, the plan is too general and ambiguous to be considered a specific target for all secondary material usage. ⁹³	Secondary material usage	0
Ford has supported battery recycling companies with letters of support for US Department of Energy grants. ⁹³ The company has partnered with Everledger to pilot a "battery passport" for tracking the lifecycle of batteries to help its recycling at the end of their lives. ⁹⁸ Ford partners with Redwood Materials, a battery materials company, to integrate battery recycling into its domestic battery strategy. ⁹⁹ However, Ford has not disclosed any measurable investment or capacity related to battery reuse and recycling.	EV batteries – reuse and recycling	0.5
Deductions		
Ford received a score of C by LobbyMap. ¹⁰⁰	Negative climate lobbying	-0.5

Company profile: General Motors

2022 Market Share: 5.57%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
27.6	16.1	12.0	0.5	-1.0

Percentage of ZEV sales in 2022: 1.90%

General Profile

General Motors' ICE vehicle phase-out performance is overall subpar. The carmaker's ZEV sales proportion for 2022 was a mere 1.90%; its ZEV sales proportion for the past five years is even lower and did not break the 1%-mark, highlighting the lack of a demonstrable commitment in transitioning away from ICE vehicles. General Motors' absolute sales number for ZEVs is likewise among the lowest compared to its peers despite the sheer volume of cars that General Motors produced and sold in 2022. General Motors is a signatory of the COP26 pledge and has appropriate ICE vehicle phase-out commitments.

However, whilst General Motors' ZEV sales are unambitious and leave room for improvement, the company has a strong sustainability portfolio that emphasises the use of renewable energy, carbon emissions reduction, and steel decarbonisation – mostly with quantifiable future milestones. The carmaker stands out for having targets to increase the use of secondary steel. Overall, General Motors performs decently in Scope 1, Scope 2, and Scope 3 disclosures and targets and has a good level of transparency about its emission reduction plans. General Motors's disclosure about its material use reduction and efficiency status and targets is inadequate; its engagement with climate policies is lacking.

General Motors's commitments and targets are a good first step but they need to be consistent with the carmaker's ZEV sales performance in order to have a positive impact on the automotive industry.

Phase-out of ICE vehicles		subscore
General Motors' score in this category has dropped significantly compared to last year, and the main reason is the partial reassignment of vehicles sold under the SAIC-GM-Wuling Automotive joint venture partnership from General Motors to SAIC. With the updated marque classification of GM, the 2022 ZEV proportion is 1.90%, representing 83,904 vehicles. General Motors's CAGR of 42.10% is modest.	Percentage of ZEV sales (2022)	1.58
	Percentage of ZEV sales (2018-2022)	0.58
	CAGR for ZEV sales (2018-2022)	0
Within ICE vehicle holdout jurisdictions, US-based ZEV sales accounted for a lion's share of total ZEV sales in 2022. Canada and South Korea are also significant ZEV markets for General Motors.	Market concentration in ICE vehicle holdout markets	1.15
General Motors is a COP26 signatory and has pledged the ambition to achieve a complete phase-out of ICE vehicles in Europe, the US, and China by 2035, and globally by 2040. ¹⁰¹ General Motors also plans to scale up its ZEV production capacity of its manufacturing facilities – an annual production capacity target of 1 million ZEVs in North America and at least 2 million ZEVs globally by 2025 was made in 2022. ⁶⁶ General Motors' targets are ambitious in light of its current low ZEV sales number and a targeted effort needs to be articulated and implemented in order to reach the target.	ICE vehicles phase-out plan	10.76

^v Sales of vehicles under the marque Wuling were included in GM's sales figures last year but appear under SAIC's sales figure in this year's report. The ZEV sales proportion for GM in last year's report was therefore 8.18%

General Motor drivers can use EVGo – a public charging network – in 30 US states. ¹⁰² Renewable energy is provided through RECs.	Renewable energy charging	2.00
Supply chain decarbonisation		
Scope 1 and 2		
General Motors reports the commitment to power their US sites with renewable electricity by 2025 and a target to “secure enough renewable electricity” to power all its sites globally by 2035. ¹⁰³ The global target is a welcome improvement, but information about concrete steps that will be taken to secure an adequate supply of renewable electricity has not been released. In addition, it is committed to Scope 1 and Scope 2 targets to reduce carbon emissions by 72% by 2035 from a base year of 2018. ¹⁰³	Renewable energy commitments	3
	Carbon reduction targets	1
Scope 3: purchased goods and services		
General Motors has disclosed its Scope 3 purchased goods and services emissions data in its official report. ¹⁰³ Additionally, it has set Scope 3 purchased goods and services decarbonisation targets for suppliers in carbon-intensive industries to be carbon neutral by 2038 or sooner for raw materials and its logistics. ¹⁰³ However, this target lacks a clear roadmap.	Disclosure and targets	3
General Motors is a part of the First Movers Coalition. ⁴¹ As a member, General Motors is expected to increase its use of secondary steel in line with the Coalition's collective target of emitting less than 0.1 tonnes of emissions per tonne of crude steel produced with 100% input of secondary steel. ⁹⁴ It is also announced that by 2030 at least 10% of the crude steel it directly purchases for the US, Canada, and Mexico facilities would be near-zero emission, but with the caveat that this only applies if the price is no more than 20% higher than the current price. ¹⁰³ In 2023, General Motors initiated a partnership with ArcelorMittal for the production of low-carbon steel. ¹⁰⁴	Steel decarbonisation	6
In 2022, SUVs accounted for 40% of General Motors' total sales, a figure that has been steadily rising for the past five years.	SUV share	-1
Resource reduction and efficiency		
General Motors has not set any specific targets to reduce its overall use of raw materials.	Targets on raw material reduction	0
General Motors has not set any quantifiable targets to increase its uptake of secondary materials.	Secondary material usage	0
The official General Motors report indicates that there are several recycling initiatives, including a collaboration with the US Department of Energy Advanced Battery Consortium to advance lithium-ion battery recycling. ¹⁰³ Additionally, General Motors is incorporating responsible battery recycling considerations such as the recycling / reusing of 100% of batteries returned to General Motors. ¹⁰³ Despite these initiatives, no quantitative targets are mentioned.	EV batteries – reuse and recycling	0.5
Deductions		
General Motors received a score of C by LobbyMap. ¹⁰⁵	Negative climate lobbying	-0.5
General Motors was fined \$128.2 million for failing to meet the US federal fuel-economy standards. ⁷⁷	Violations of environmental regulations	-0.5

Company profile: Great Wall

2022 Market Share: 1.51%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
10.8	11.8	-1.0	0.0	-0.0

Percentage of ZEV sales in 2022: 9.02%

General Profile

Great Wall is placed towards the lower end of the chart. The carmaker's ICE phase-out performance is modest, and while the vast majority of its sales is still driven by ICE vehicles, its ZEV proportion is relatively high compared to its peers. The ZEV sales figures have increased from year to year, from less than half a percent to almost 10% over the course of five years. The sales figures indicate a positive trajectory, though nonetheless in need of a serious ramp-up. The carmaker has committed to carbon neutrality by 2045. Although it is a good first step, the lax timeline lacks ambition and the target year needs to be pushed forward.

Great Wall has not made any targets or goals for renewable energy adoption, Scope 3 decarbonisation, steel decarbonisation, and reduction of material consumption. Great Wall has not made disclosures about its emissions or carbon reduction targets either. Great Wall is noted for its high SUV sales proportion of 72% — the highest among all fifteen carmakers. Due to a lack of data, Great Wall is not assessed on its engagement with climate policies.

Great Wall has a weak sustainability profile and needs to address supply chain and purchased goods decarbonisation, and to articulate a more ambitious roadmap towards a full ICE phase-out.

Phase-out of ICE vehicles		subscore
In 2022, Great Wall sold 108,040 ZEVs, accounting for 9.02% of its total sales. In contrast, its 2018 ZEV sales figure was a mere 5,245 and accounted for 0.49% of its total sales. Great Wall's ZEV sales have grown considerably over the past five years. Its CAGR of 107.24% reflects its electrification performance.	Percentage of ZEV sales (2022)	7.52
	Percentage of ZEV sales (2018-2022)	3.95
	CAGR for ZEV sales (2018-2022)	0
The vast majority of Great Wall's ZEV sales is in China. Great Wall has a minor presence in Thailand.	Market concentration in ICE vehicle holdout markets	0.38
Great Wall does not have an ICE phase-out plan.	ICE vehicles phase-out plan	0
Great Wall does not have a renewable energy charging option.	Renewable energy charging	0

Supply chain decarbonisation		
Scope 1 and 2		
Great Wall has not disclosed any information on renewable energy targets, although the company reveals that renewable energy accounts for 6.09% of its total energy consumption. ¹⁰⁶ Regarding carbon reduction targets, Great Wall has stated to be fully carbon neutral by 2045 but does not provide a specific plan. ¹⁰⁶	Renewable energy commitments	0
	Carbon reduction targets	0
Scope 3: purchased goods and services		
Great Wall has not released any information on this scoring criterion.	Disclosure and targets	0
Great Wall has not released information on its steel decarbonisation target nor its plan for secondary steel use. The company has partnered with Hebei Iron and Steel Group for low carbon supply. ¹⁰⁷ However, nothing specific has been disclosed, such as procurement quantity or supply timeline.	Steel decarbonisation	1
Great Wall's share of SUVs was the highest among the fifteen companies, accounting for 72% of total sales. Great Wall is penalised 2 points for its high proportion of SUVs.	SUV share	-2
Resource reduction and efficiency		
Great Wall has not set any specific targets to reduce the overall use of raw materials.	Targets on raw material reduction	0
Great Wall has not set any specific targets to raise its percentage of the use of secondary materials.	Secondary material usage	0
Great Wall has not released any information on this scoring criterion.	EV batteries – reuse and recycling	0
Deductions		
No data on Great Wall's engagement with climate policies exists on LobbyMap.	Negative climate lobbying	N/A

Company profile: Honda

2022 Market Share: 4.78%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
14.7	13.7	1.0	0.5	-0.5

Percentage of ZEV sales in 2022: 0.67%

General Profile

Honda's ICE vehicle phase-out performance is below average across the board, but Honda is the only major Japanese automaker that has announced a complete ICE phase-out plan. Its commitment to phase out ICE vehicles stands in contrast to its ZEV sales proportion which had yet to reach 1% of total sales as of the end of 2022. However, Honda deserves recognition for its high CAGR and comprehensive ICE phase-out plan that targets 100% ZEV sales across all markets, though the target year 2040 is unambitious and needs to be expedited.

Honda's supply chain decarbonisation targets are poor. The carmaker has not issued any appropriate carbon reduction targets for Scope 1, Scope 2, or Scope 3 Category 1. Honda has likewise not made any steel decarbonisation targets but has announced a low-carbon steel procurement partnership with POSCO. Honda also lacks ambitious targets on material use reduction and efficiency, though it participates in a number of ZEV battery reuse and recycling initiatives. Honda is further deducted half a point for its failure to engage with climate policies.

Honda needs to both urgently ramp up its ZEV sales and commit to appropriate carbon reduction targets for its supply chains.

Phase-out of ICE vehicles		subscore
Honda's ZEV proportion was 0.67% in 2022 and 0.23% over the past five years. Honda sold 25,416 ZEVs in 2022. The ZEV sales performance is low. Honda's CAGR of 117.55% is attributed to its late transition towards electrification.	Percentage of ZEV sales (2022)	0.56
	Percentage of ZEV sales (2018-2022)	0.16
	CAGR for ZEV sales (2018-2022)	2.50
Honda sells most of its ZEVs in China and Europe, with a small share in Japan, but does not have a strong presence in ICE vehicle holdout markets.	Market concentration in ICE vehicle holdout markets	0.38
Honda's target is to reach 100% ZEV sales globally by 2040, with the exception of China for which the target year for a full ICE phase-out is 2035. ¹⁰⁸	ICE vehicles phase-out plan	8.84
Honda's e:PROGRESS home charging network, available in the UK, uses RECs. ¹⁰⁹	Renewable energy charging	1.25

Supply chain decarbonisation		
Scope 1 and 2		
Honda has set a goal of achieving net zero emissions by 2050 for all of its products and corporate activities, and the company's interim target is a 46% reduction in CO ₂ emissions by 2030 compared with FY2019. ¹⁰⁸ Honda's business sites used 1,498 gigawatt hours (GWh) from renewable sources in FY2022, and the company has announced that it will use 100% renewable energy in its manufacturing plants by 2030 for North America only. ^{108,110}	Renewable energy commitments	0
	Carbon reduction targets	0
Scope 3: purchased goods and services		
Honda published its Scope 3 emissions from purchased goods and services through the CDP database. However, the company has not set any targets for Scope 3 purchased goods and services.	Disclosure and targets	1
Honda has no specific targets for steel decarbonisation. Honda has announced that it has partnered with POSCO to produce steel sheets which can contribute to reducing carbon emissions. ¹¹¹ The company has not set any targets for the usage of secondary steel.	Steel decarbonisation	1
In 2022, SUVs accounted for 42% of Honda's total sales. Honda is one of six automakers with SUV sales representing more than 40% of overall sales.	SUV share	-1
Resource reduction and efficiency		
Honda has not set any specific targets to reduce the overall use of raw materials.	Targets on raw material reduction	0
Honda has not set any specific targets to raise its percentage of the use of secondary materials.	Secondary material usage	0
In Europe, Honda partners with Société Nouvelle d’Affinage des Métaux to collect batteries from hybrids and EVs to be reused for energy storage or recycled. ¹¹²	EV batteries – reuse and recycling	0.5
Deductions		
Honda received a score of D+ by LobbyMap. ¹¹³	Negative climate lobbying	-0.5

Company profile: Hyundai-Kia

2022 Market Share: 8.06%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
20.5	17.5	3.0	0.5	-0.5

Percentage of ZEV sales in 2022: 5.58%

General Profile

Hyundai-Kia's electrification process has been steady but at a rate too slow for the expectations of the automotive industry, with an increase in its ZEV sales between one to two percentage-points per year over the past five years. Hyundai-Kia needs to accelerate its electrification rate and phase out ICE vehicles much quicker than its current performance. With unambitious and incomplete ICE vehicles phase-out targets, it remains unclear whether Hyundai-Kia has any plans to end tailpipe emissions of its vehicles. Hyundai-Kia's ICE vehicles phase-out targets are primarily for the major markets, and the company lacks commitments in emerging markets. Hyundai-Kia should create a roadmap towards 100% ZEV sales with clear milestones and timeline.

Hyundai-Kia's supply chain and purchased goods and services' decarbonisation targets are lacklustre and fail to meet the appropriate level expected for major players in the automotive industry. Its 2045 carbon neutrality goal for Scope 1, Scope 2, and Scope 3 purchased goods and services is severely lacking ambition and urgency, and the timeline needs to be pushed forward. Hyundai-Kia's steel decarbonisation performance is mediocre, and its rise in SUV proportion over the past five years is a serious concern that needs an immediate about-face. Its material use reduction and efficiency targets are likewise lacking.

Hyundai-Kia's overall performance is poor. It has decent ZEV sales volumes in select ICE vehicle holdout jurisdictions but its sustainability policies are weak and showcase a low ambition level misaligned with the climate emergency. Hyundai-Kia needs to rapidly speed up its electrification process, halt the production of SUVs, and commit to a more ambitious sustainability policy.

Phase-out of ICE vehicles		subscore
Hyundai-Kia sold 357,186 ZEVs in 2022. In the past three years, Hyundai-Kia has increased its ZEV sales by around 100,000 units from year to year. Despite that, the carmaker's ZEV proportion sat at a modest 5.58% in 2022, and its ZEV growth exhibits an upward trajectory in dire need of acceleration. Its CAGR is modest at 77.11%.	Percentage of ZEV sales (2022)	4.65
	Percentage of ZEV sales (2018-2022)	1.72
	CAGR for ZEV sales (2018-2022)	1
Hyundai-Kia's relatively high ZEV sales number in five ICE vehicle holdout markets — Australia, Canada, Indonesia, South Korea, and the US — helped the carmaker achieve a better score in this criterion compared to other carmakers.	Market concentration in ICE vehicle holdout markets	1.92
Hyundai has pledged a 2030 ICE phase-out of 71% in Europe, 53% in the US, and 34% globally. ¹¹⁴ Kia has pledged a 2030 ICE phase-out of 74% in Europe, 40% in China, and 37% globally. ¹¹⁴ Neither carmaker has made plans for a full ICE phase-out.	ICE vehicles phase-out plan	6.20
Hyundai-Kia users can access three public charging schemes: Charge myHyundai, Kia Charge, and IONITY. ^{79,115,116} All three only operate in Europe and use offset schemes and RECs.	Renewable energy charging	2

Supply chain decarbonisation		
Scope 1 and 2		
Hyundai has pledged to decrease absolute Scope 1 and Scope 2 GHG emissions at its business sites by 45% by 2030 ¹¹⁷ , with a target of 75% by 2040 ¹¹⁸ . Kia's target is 97% carbon reduction by 2045. ⁶⁸	Renewable energy commitments	1
Hyundai has set a goal to achieve 100% transition to fully renewable energy sources by 2045. ¹¹⁷ Kia aims to achieve 63% renewable energy by 2030 and 100% by 2040. ⁶⁸ Hyundai and Kia plan to achieve full carbon neutrality by 2045. ¹¹⁴ Although this plan covers the company's entire value chain, the targets are too unambitious to be credited.	Carbon reduction targets	0
Scope 3: purchased goods and services		
Hyundai-Kia has disclosed its Scope 3 purchased goods and services in the CDP database and in each of their reports. Hyundai's unambitious targets of 10% by 2035 and 65% by 2040 in last year's report have not been confirmed in the latest official report. ¹¹⁷ The same applies to Kia. While Kia's targets were shown as 50% carbon reduction by 2030 in core materials, the latest official documents include a far less ambitious target: a 10% reduction in carbon emissions, with the aim of achieving over 90% carbon neutrality in its supply chain by 2045. ⁶⁸	Disclosure and targets	2
Hyundai-Kia has no specific targets for steel decarbonisation. Hyundai and Kia have partnered with POSCO Corp. to produce hydrogen-reduced steel, but specific plans (e.g. start date of supply, scale of supply) were not found in the latest official reports. ^{119,120} The company has not set any targets for the usage of secondary steel.	Steel decarbonisation	2
SUVs comprised 53% of Hyundai-Kia's total sales in 2022, and the carmaker's sales figure over the past five years shows an unsustainable increase in SUV proportion. For its high SUV proportion, Hyundai-Kia is deducted 2 points.	SUV share	-2
Resource reduction and efficiency		
Hyundai-Kia has not set any specific targets to reduce its overall use of raw materials.	Targets on raw material reduction	0
Hyundai-Kia has not set any specific targets to increase its overall percentage of secondary materials usage.	Secondary material usage	0
Hyundai has been running a pilot project to reuse second-life batteries for energy storage systems at its Ulsan plant since 2018, with a capacity of 2 MWh. ¹²¹ Kia has also partnered with Encore for energy storage systems. As of April 2023, 104 batteries have been delivered for reuse as components for ESS. ⁶⁸	EV batteries – reuse and recycling	0.5
Deductions		
Hyundai Motor Group received a score of D+ by LobbyMap. ¹²²	Negative climate lobbying	-0.5

Company profile: Mercedes-Benz

2022 Market Share: 2.62%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
41.1	25.6	13.0	3.0	-0.5

Percentage of ZEV sales in 2022: 7.25%

General Profile

Mercedes-Benz is electrifying its passenger car sales at a rate that is roughly on par with its fellow German carmakers, achieving a year-to-year increase of more than two percentage-points for the third year in a row. Its ZEV sales proportion sat at 7.25% for 2022 but its growth needs to be accelerated in order to achieve the 2035 / 2040 ICE phase-out to which the carmaker has committed.

Mercedes-Benz's Scope 1, Scope 2, and Scope 3 Category 1 targets are all appropriate and largely in line with the expectations for the automotive industry. Mercedes-Benz's targets in renewable energy adoption, carbon reduction, and disclosures to the Carbon Disclosure Project earned the carmaker a joint top placement for its Supply Chain Decarbonisation commitments. Its commitments towards steel decarbonisation stand out because of the carmaker's various partnerships that signify tangible efforts. Its material use reduction and efficiency targets are likewise appropriate although it does not sufficiently address if it will make tangible targets in reducing raw material consumption.

Mercedes-Benz has a consistent performance across all criteria and places 1st in this year's ranking guide. Its top placement signifies a strong sustainability profile that is centred around a set of appropriate ICE vehicle phase-out plans as well as tangible and quantifiable decarbonisation targets. It is important that Mercedes-Benz lives up to its commitments.

Phase-out of ICE vehicles		subscore
7.25% of Mercedes-Benz's total sales in 2022 were ZEVs. When considering the past five years from 2018 to 2022, this number drops to 2.79%. Mercedes-Benz has a modest five-year CAGR of 85.98% which can be attributed to its status as a late transitioner in large-scale ZEV sales.	Percentage of ZEV sales (2022)	6.04
	Percentage of ZEV sales (2018-2022)	1.90
	CAGR for ZEV sales (2018-2022)	2
Mercedes-Benz has modest ZEV sales volume in Australia, Japan, South Korea, Turkey, and the US.	Market concentration in ICE vehicle holdout markets	1.92
Mercedes-Benz is a COP26 signatory and has pledged to achieve a complete phase-out of ICE vehicles in Europe, the US, and China by 2035, and globally by 2040. ¹²³ It is among the most ambitious carmakers assessed in this guide.	ICE vehicles phase-out plan	10.76
Mercedes-Benz participates in the me Charge and IONITY public charging networks that operate renewable energy charging points throughout Europe, mainly through unclear offset schemes combined with direct purchase at a small scale. ^{79,124}	Renewable energy charging	3.0

Supply chain decarbonisation		
Scope 1 and 2		
Mercedes-Benz aims to achieve carbon neutrality by 2039. ⁶³ From 2022, all of the company's own production plants have obtained 100% of their external electricity from renewable sources on the balance sheet ^{vi} . The company aims to reduce 50% of Scope 1 and Scope 2 emissions at Mercedes-Benz cars and vans plants worldwide by 2030 compared to 2020 levels. ¹²⁵	Renewable energy commitments	3
	Carbon reduction targets	1
Scope 3: purchased goods and services		
Mercedes-Benz has disclosed its Scope 3 purchased goods and services emissions data in its official report and on the CDP database. Based on 2020 emissions, the company has set a target to source only CO ₂ -neutral production materials by 2039. ⁶³	Disclosure and targets	5
Mercedes-Benz aims to use over 200,000 tonnes of CO ₂ -reduced steel from European suppliers in its press shops annually. ¹²⁶ In 2021, the company took a stake in H2 Green Steel and signed a supply agreement for around 50,000 tonnes less-carbon steel for plants in Europe. ¹²⁷ The company also initiated a partnership with Salzgitter Flachstahl GmbH and Swedish steel manufacturer SSAB to lower carbon emissions generated from steel production. ⁶³ It has not set any targets around the use of secondary steel.	Steel decarbonisation	5
In 2022, SUVs constituted 40% of Mercedes-Benz's total sales, and this percentage has been progressively increasing for the past four years.	SUV share	-1
Resource reduction and efficiency		
Mercedes-Benz mentions its plan to decouple resource consumption from growth of production volume. ⁶³ The company has not established any particular goals to decrease its total raw material usage.	Targets on raw material reduction	0
Mercedes-Benz aims to raise the usage of secondary materials in their passenger car fleet to an average of 40% by 2030. ⁶³	Secondary material usage	2
Mercedes-Benz has an integrated business model for large-scale stationary energy storage. Energy storage systems that serve as backup power sources for vehicles have a total capacity of more than 95MWh and are in operation in Germany. ¹²⁸ In addition, its Factory 56 at Sindelfingen is powered by a stationary energy storage system with a capacity of 1,400 kilowatt hours (kWh) as well as solar energy. ¹²⁹	EV batteries – reuse and recycling	1
Deductions		
Mercedes-Benz received a score of C- by LobbyMap. ¹³⁰	Negative climate lobbying	-0.5

vi Mercedes-Benz announced their commitment to power their own operations with 70% renewable energy in 2030. With the presumption of a linear trajectory in the renewable energy transition, the 70% goal for 2030 is en route to achieving 100% renewable energy use by 2035. We consider Mercedes-Benz's commitments as fulfilling the renewable energy scoring criterion.

Company profile: Nissan

2022 Market Share: 3.70%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
13.9	9.9	1.0	3.5	-0.5

Percentage of ZEV sales in 2022: 2.98%

General Profile

Nissan's decarbonisation performance scores low across a multitude of criteria. Nissan sold 87,609 units of ZEVs in 2022 compared to its total sales of nearly 3 million cars. As one of the world's biggest carmakers, its lack of ZEV sales figures is noticeable. Despite leading the way with ZEV sales globally with the Leaf for many years, Nissan now has the lowest CAGR of all carmakers that sell ZEVs at 10.71%. The company renewed its ZEV development plan in September 2023, with a new target of making 100% new car sales ZEV in Europe by 2030. The company says it will increase its EV models to meet the growing needs.

Nissan's material use reduction and efficiency targets are good for raw materials, and it is the only carmaker that achieved a full score in this criterion. However, Nissan's supply chain decarbonisation targets are generally poor across all scoring criteria, and the automaker lacks clear and quantifiable targets for its consumption of secondary materials. It is further deducted 0.5 points for its failure to engage with climate policies.

Phase-out of ICE vehicles		subscore
Nissan's ZEV proportion has stayed consistently within the range of 1.79 to 2.98% over the past five years with a gradual increase. In 2022, its ZEV proportion sat at 2.98% with a CAGR of 13.56%.	Percentage of ZEV sales (2022)	2.49
	Percentage of ZEV sales (2018-2022)	1.31
	CAGR for ZEV sales (2018-2022)	0
Nissan's score comes from its sales figures in Australia, Canada, Japan, and the US.	Market concentration in ICE vehicle holdout markets	1.54
Nissan has committed to an ICE vehicles phase-out target in Europe by 2030. ⁵³ The company has set a 40% EV sales target in the US by 2030, 35% in China, and 58% in Japan by 2026. ¹³¹ It sets a target of 'electric car' sales ratios for Europe, China, and Japan for 2026. For China and Japan, the figures include "e-Power cars" that run on gasoline engine and motor."	ICE vehicles phase-out plan	3.31
Nissan's ZESP3 project offers renewable energy charging through 7,900 quick chargers nationwide in Japan, however the source of renewable energy is unclear. ¹³²	Renewable energy charging	1.25

Supply chain decarbonisation		
Scope 1 and 2		
Nissan committed to reduce CO ₂ emissions from its corporate activities by 30% per vehicle by 2022 from the base year of 2005 to achieve carbon neutrality by 2050. ¹³¹ Nissan has not set renewable energy targets, but it disclosed that the company's renewable energy usage has reached 11.9%. ¹³¹ Some of Nissan's locations are currently powered by 100% renewable energy, including its global headquarters and Brazil headquarters. ¹³³	Renewable energy commitments	0
	Carbon reduction targets	0
Scope 3: purchased goods and services		
Nissan disclosed Scope 3 purchased goods and services emissions on the CDP database. There are no specific reduction targets regarding Scope 3 purchased goods and services.	Disclosure and targets	1
Nissan has no specific targets for steel decarbonisation. It has partnered with Kobe Steel to produce carbon-reduced steel, but it still relies on blast furnaces. ¹³⁴ The company has not set any targets for the usage of secondary steel.	Steel decarbonisation	1
In 2022, SUVs accounted for 37% of Nissan's total sales. These figures have remained at similar levels for the past five years and have not grown as steadily as other automakers.	SUV share	-1
Resource reduction and efficiency		
As part of the Nissan Green Program 2022, Nissan has set a goal to reduce dependency on newly mined resources by 70% of the materials used in their vehicles by 2050, compared to a 2010 baseline. ¹³¹ Despite being the only carmaker to establish a target for raw material reduction, no progress or updates have been reported since the announcement.	Targets on raw material reduction	2
Nissan's plans to use secondary materials lack specific and holistic plans. ¹³¹	Secondary material usage	1
Nissan launched 4REnergy in 2010 to develop reuse and recycling solutions for EV batteries, e.g., energy storage solutions for repurposed lithium-ion batteries and battery refabrication. ¹³¹ Nissan has partnered with Enel to launch an innovative 'Second Life' storage system for used electric car batteries to be used as a back-up generator. ¹³⁵ The UK's EV36Zero initiative also aims to repurposing EV batteries as 1MW energy storage. ¹³⁶	EV batteries – reuse and recycling	0.5
Deductions		
Nissan received a score of C- by LobbyMap. ¹³⁷	Negative climate lobbying	-0.5

Company profile: Renault

2022 Market Share: 2.49%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
24.5	16.0	7.0	2.0	-0.5

Percentage of ZEV sales in 2022: 10.59%

General Profile

Renault's decarbonisation performance places it in the middle among the major carmakers. The carmaker is remarked for its modest performance across the three pillars, underscored by a lack of pledges in key decarbonisation areas. Its ZEV sales proportion of 10.59% leaves room for improvement, but the carmaker has shown a promising trajectory and a consistent albeit slower-than-needed progress towards electrification. It has only committed to a full ICE phase-out in Europe with an ambitious 2030 target year. Similar goals are needed for China – one of Renault's key markets.

Renault has made appropriate Scope 1 and Scope 2 renewable energy and carbon reduction targets that are largely in line with minimum expectations for the automotive industry. However, its other commitments are severely lacking. Noticeably, Renault lacks a focus on the carbon footprint of its steel consumption and is one of the few carmakers that scored a zero in steel decarbonisation. Renault earned a full score for its efforts into building capacity of EV battery reuse or recycling, but its raw and secondary material use reduction and efficiency targets are lacking. It is deducted 0.5 points for its failure to engage with climate policies.

Renault urgently needs to commit to a full ICE phase-out globally and take steps to further decarbonise its supply chains.

Phase-out of ICE vehicles		subscore
Renault sold 209,306 ZEVs in 2022, representing 10.59% of its total sales. Its ZEV proportion has grown over the past five years from 1.61% in 2018 with an increase of more than two percentage-points each year from 2019 to 2022. Its CAGR of 60.13% is relatively low but can be attributed to Renault's early transition towards electrification.	Percentage of ZEV sales (2022)	8.83
	Percentage of ZEV sales (2018-2022)	3.32
	CAGR for ZEV sales (2018-2022)	0
Renault sells most of its ZEVs in China and Europe and only has very modest sales in South Korea and Turkey.	Market concentration in ICE vehicle holdout markets	0.77
Renault has only committed to a full phase-out of ICE vehicles in Europe by 2030. ⁶²	ICE vehicles phase-out plan	2.11
Renault operates small-scale renewable energy charging options in Utrecht, the Netherlands; and Fernando de Noronha, Brazil, through direct purchase schemes. ^{138,139}	Renewable energy charging	1

Supply chain decarbonisation		
Scope 1 and 2		
Renault committed to reduce its sites' GHG emissions by 50% by 2030 from a 2019 baseline. The company set a goal to achieve 70% renewable energy at all its sites by 2030. ^{vii,62}	Renewable energy commitments	2
	Carbon reduction targets	1
Scope 3: purchased goods and services		
Renault performs well in disclosing information and data on its Scope 3 purchased goods and services emissions, as well as setting targets for its supply chain partners. In particular, Renault aims to reduce emissions by 30% in its parts and materials supply chain by 2030. ¹⁴⁰	Disclosure and targets	4
Renault disclosed that its 30% emissions reduction goal for the parts and materials supply chain by 2030 includes steel decarbonisation. ¹⁴⁰ Decarbonisation goals specific to steel have not been disclosed.	Steel decarbonisation	1
In 2022, SUVs accounted for 36% of Renault's total sales. While Renault cannot be considered as a leading carmaker when it comes to SUV sales, its SUV sales proportion has risen noticeably over the past three years, from 29% to 36%.	SUV share	-1
Resource reduction and efficiency		
Renault has not set any specific targets to reduce the overall use of raw materials.	Targets on raw material reduction	0
Renault has set a target to boost the use of recycled materials in new vehicles by 33% worldwide by 2030. ⁶²	Secondary material usage	1
Renault initiated its Advanced Battery Storage project, a stationary energy storage system that utilises retired batteries from electric vehicles. The system is set to be rolled out at several sites in Europe and reach a capacity of 70MWh. Additionally, the SmartHubs project in the UK utilises 1,000 recycled batteries with a total capacity of 14.5MWh. ¹⁴¹	EV batteries – reuse and recycling	1
Deductions		
Renault received a score of D+ by LobbyMap. ¹⁴²	Negative climate lobbying	-0.5

vii Renault announced a commitment to power its own operations with 70% renewable energy in 2030. With the presumption of a linear trajectory in the renewable energy transition, the 70% goal for 2030 is en route to achieving 100% renewable energy use by 2035. We consider Renault's commitments as fulfilling the renewable energy scoring criterion.

Company profile: SAIC

2022 Market Share: 3.68%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
35.3	36.8	-1.0	0.0	-0.5

Percentage of ZEV sales in 2022: 30.93%

General Profile

SAIC is noted for its exceptionally high ZEV sales, both proportionally and in absolute numbers. This performance is underscored by a sharp rise in ZEV sales in the last five years that has seen a more than doubling from year to year between 2018 and 2021. SAIC is the only carmaker that exceeded the target of 30% ZEV sales in 2022 and was awarded full score for that criterion. The carmaker has not published information about any plans to reach a partial or full ICE phase-out and it remains unclear whether SAIC is gearing towards full electrification. SAIC has a sizable presence in three emerging ZEV markets – India, Indonesia, and Thailand.

On the flip side, SAIC has not made any targets or goals for Scope 1 and Scope 2 decarbonisation, Scope 3 decarbonisation, steel decarbonisation, and reduction of material consumption. SAIC has not made disclosures about its emissions or carbon reduction targets either. The lack of information and transparency from SAIC makes it difficult to assess whether the carmaker does not disclose or does not have a sustainability policy. For its lack of engagement with climate policies, SAIC is deducted 0.5 points.

SAIC has a weak sustainability profile and needs to address supply chain and purchased goods decarbonisation, and to articulate a clear roadmap towards a full ICE phase-out.

Phase-out of ICE vehicles		subscore
SAIC has reported the single-highest ZEV proportion among the 15 automakers in 2022 of 30.93%, a nearly 50% increase from the previous year (21.14%) and more than three-fold increase from two years prior (10.00%). SAIC's ZEV proportion over the past five years of 14.15% is also the highest in this guide. In absolute numbers, SAIC sold substantially more ZEVS than any other carmaker in this guide, at 903,874 units. Its CAGR at 95.87% signifies rapid progress and an ongoing commitment to electrification.	Percentage of ZEV sales (2022)	25.00
	Percentage of ZEV sales (2018-2022)	9.62
	CAGR for ZEV sales (2018-2022)	1
SAIC is the only carmaker that has a pronounced ZEV market presence in India, Indonesia, and Thailand.	Market concentration in ICE vehicle holdout markets	1.15
SAIC has not released any information on this scoring criterion.	ICE vehicles phase-out plan	0
SAIC does not have a renewable energy charging option.	Renewable energy charging	0

Supply chain decarbonisation		
Scope 1 and 2		
SAIC has not disclosed any information on renewable energy targets.	Renewable energy commitments	0
	Carbon reduction targets	0
Scope 3: purchased goods and services		
SAIC has not released any information on this scoring criterion.	Disclosure and targets	0
SAIC has not released any information on this scoring criterion.	Steel decarbonisation	0
SUVs comprised 30% of SAIC's total sales in 2022.	SUV share	-1
Resource reduction and efficiency		
SAIC has not released any information on this scoring criterion.	Targets on raw material reduction	0
SAIC has not released any information on this scoring criterion.	Secondary material usage	0
SAIC has not released any information on this scoring criterion.	EV batteries – reuse and recycling	0
Deductions		
SAIC received a score of C by LobbyMap. ¹⁴³	Negative climate lobbying	-0.5

Company profile: Stellantis

2022 Market Share: 6.33%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
26.3	15.8	11.0	0.5	-1.0

Percentage of ZEV sales in 2022: 4.98%

General Profile

Stellantis' ICE phase-out performance is weak. Stellantis sold 526,016 units of ZEVs between 2018 and 2022 and is placed among the biggest EV producers when measured in sheer volume. However, this placement is predominantly due to its high total sales volume. When measured in ZEV sales proportion, Stellantis pales in comparison to its peers with a mere 5% ZEV proportion in 2022, and it was only in 2020 that the combined marques of the group reached 1% ZEV sales proportion.

Stellantis has made appropriate Scope 1 and Scope 2 renewable energy and carbon reduction targets that are in line with expectations for the automotive industry. However, its other commitments are severely lacking. The ICE phase-out targets are only for the European, US, and Chinese market, and a comprehensive global plan for a full phase-out of ICE vehicles is necessary. Similarly, Stellantis' disclosures to the Carbon Disclosure Project, its commitment to steel decarbonisation, and its material use reduction and efficiency commitments are either lacking altogether or lack ambition and clear targets. Stellantis is noted for its target to meet 25% of its steel consumption with low-carbon steel by 2025.⁵²

Overall, Stellantis performs well below average across all criteria and is in urgent need of ramping up its ZEV sales as well as committing to clear decarbonisation targets for both its supply chain and ICE phase-out.

Phase-out of ICE vehicles		subscore
Stellantis achieved a 4.98% ZEV proportion in 2022 and an average of 1.73% between 2018 and 2022. Its five-year CAGR of 140.11% signifies an upwards and accelerating trend in EV adoption, although the high CAGR score should be understood in the context of Stellantis' late transition towards electrification with a mere 0.15% ZEV proportion in 2018.	Percentage of ZEV sales (2022)	4.15
	Percentage of ZEV sales (2018-2022)	1.17
	CAGR for ZEV sales (2018-2022)	3
Stellantis scored very low in this criterion. The overwhelming majority of Stellantis' EV sales were in Europe, and the automaker had minimal sales in Japan and South Korea.	Market concentration in ICE vehicle holdout markets	0.77
Stellantis has pledged to achieve a 100% ICE vehicles phase-out in Europe for passenger vehicles and 50% phase-out of ICE light duty trucks in the US by 2030. ¹⁴⁴ In China, Stellantis aims for a 60% ICE vehicles phase-out by 2030. ⁵² No commitment for the global market has been made in official communications, although Stellantis' presence outside Europe and the US is comparatively smaller than its peers.	ICE vehicles phase-out plan	5.70
Stellantis and NHOA are developing the Atlante public charging network in Southern Europe, with 1,200 operating charging points that will expand to 35,000 by 2030. ¹⁴⁵ Stellantis also partners up with TheF Charging to provide renewable energy charging options in Europe through RECs. ¹⁴⁶	Renewable energy charging	1

Supply chain decarbonisation		
Scope 1 and 2		
Stellantis committed to using 50% renewable energy by 2025, increasing to 100% by 2030, in its publication in 2021. ¹⁴⁷ Stellantis has already surpassed its 2025 target as its renewable energy use in 2022 was at 55%. ⁵² The company is pledging to reduce absolute Scope 1 and Scope 2 GHG emissions by 75% by 2030 from a baseline of 2021, with the ultimate goal of achieving net zero carbon by 2038. ¹⁴⁸	Renewable energy commitments	3
	Carbon reduction targets	1
Scope 3: purchased goods and services		
Stellantis publishes its Scope 3 emissions from purchased goods and services in its official report. The company has set a goal of carbon neutrality, encompassing its supply chain, by 2038. ¹⁴⁸	Disclosure and targets	5
Currently, 10% of Stellantis' steel procurement is low-carbon steel and Stellantis aims for this figure to reach 25% by 2025. ⁵² Secondary steel accounts for 30% of Stellantis' current steel usage. ⁵² The company has not disclosed any future targets for the usage of secondary steel.	Steel decarbonisation	3
In 2022, SUVs accounted for 36% of Stellantis' total sales. This figure has been rising steadily for the past five years.	SUV share	-1
Resource reduction and efficiency		
Stellantis has not set specific targets to reduce its overall use of raw materials.	Targets on raw material reduction	0
Stellantis has not set quantifiable targets to increase its percentage of use of secondary materials.	Secondary material usage	0
Stellantis through its partners reports recycling rates of 69.3% for lithium-ion batteries and 83.8% for nickel-metal hydride batteries in European markets. ¹⁴⁸	EV batteries – reuse and recycling	0.5
Deductions		
Stellantis received a score of D+ by LobbyMap. ¹⁴⁹	Negative climate lobbying	-0.5
Stellantis was fined a record-setting \$235.5 million for failing to meet the US federal fuel-economy standards. ¹⁵⁰	Violations of environmental regulations	-0.5

Company profile: Suzuki

2022 Market Share: 3.59%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
3.2	1.7	1.0	0.5	-0.0

Percentage of ZEV sales in 2022: 0%

General Profile

Suzuki's decarbonisation and electrification performance is almost nonexistent in a time when nearly all major carmakers are transitioning away from ICE vehicles and tailpipe emissions in response to the climate emergency, albeit at varying rates. This is despite the fact that Suzuki CEO Toshiro Suzuki expressed concern in 2017 about a potential rapid shift to electrification in India – Suzuki's largest market.¹⁵¹

Along the same trajectory, Suzuki has not set any targets or goals for its supply chains decarbonisation and reduction of material consumption. Suzuki has not made disclosures about its emissions or carbon reduction targets either. The absence of quantifiable targets and transparency makes it difficult to assess whether the carmaker does not disclose or does not have a climate policy.

Suzuki is placed at the very bottom of the chart for its poor performance across the board. Suzuki does not have any appreciable ZEV presence currently but has announced to change the status quo only this year. In January, the company announced it will introduce small ZEVs in 2023 in Japan and will start selling ZEVs in Europe and India in 2024.¹⁵⁴ The company lacks a comprehensive sustainability profile and roadmap towards decarbonising its supply chain and purchased goods and services.

Phase-out of ICE vehicles		subscore
Suzuki's ZEV sales are nearly nonexistent. Only 524 ZEVs were sold in the past five years, and not a single ZEV sale in 2022 was recorded on Marklines. Suzuki sold 7,600 ZEVs in 2017 comprising 0.25% of its total sales of that year, but since then, Suzuki's ZEV sales have taken a nosedive and plummeted to almost zero.	Percentage of ZEV sales (2022)	0
	Percentage of ZEV sales (2018-2022)	0
	CAGR for ZEV sales (2018-2022)	0
Suzuki sells no ZEVs in the ICE vehicle holdout markets.	Market concentration in ICE vehicle holdout markets	0
Suzuki has committed to a 80% ICE phase-out in Europe by 2030. In Japan and India, two of Suzuki's major markets, the carmaker has pledged a mere 20% and 15% ICE phase-out by 2030, respectively. ¹⁵³	ICE vehicles phase-out plan	1.69
Suzuki does not have a renewable energy charging option. Suzuki and Power X have signed a memorandum of understanding to explore renewable energy charging options. ¹⁵⁴	Renewable energy charging	0

Supply chain decarbonisation		
Scope 1 and 2		
Suzuki has pledged to reduce carbon emissions from its business activities by 45% by 2030 and subsequently by 80% by 2050, compared to a 2016 baseline. These targets are insufficient to achieve a 1.5°C temperature rise control scenario. As for renewable energy targets, the official report only suggests a vague statement without clear targets: to "promote the introduction of renewable energy". ¹⁵⁵	Renewable energy commitments	0
	Carbon reduction targets	0
Scope 3: purchased goods and services		
Suzuki publishes its Scope 3 emissions from purchased goods and services through the CDP database. However, the company has not set any targets for Scope 3 purchased goods and services.	Disclosure and targets	1
There is no evidence that Suzuki has taken any actions towards decarbonising steel used in its supply chain, nor has it set any steel-related targets.	Steel decarbonisation	0
Suzuki's SUV sales in 2022 did not exceed 25% of its total sales and it is the only carmaker that is not deducted points in this criterion.	SUV share	0
Resource reduction and efficiency		
Suzuki aims to reduce the use of raw materials and to increase the use of recyclable materials, but has not set any specific targets. ¹⁵⁵	Targets on raw material reduction	0
Suzuki has not set any specific targets to raise its percentage of the use of secondary materials.	Secondary material usage	0
Suzuki has developed technology that uses small lithium-ion batteries collected from end-of-life vehicles to power solar street lights. ¹⁵⁵	EV batteries – reuse and recycling	0.5
Deductions		
No data on Suzuki's engagement with climate policies exists on LobbyMap.	Negative climate lobbying	N/A

Company profile: Toyota

2022 Market Share: 12.27%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
12.4	7.9	4.0	1.0	-0.5

Percentage of ZEV sales in 2022: 0.24%

General Profile

Toyota sold a scant 23,251 units of ZEVs in 2022, representing 0.24% of its total sales, which is exceedingly low for a carmaker of its size and is dwarfed even by the ZEV sales volume of much smaller carmakers. Its ZEV sales growth measured in CAGR is likewise low and signifies a carmaker that has been slow in putting in the effort in the transition towards electrification. Indeed, Toyota has yet to make a commitment to phase out ICE vehicles completely but has targeted the sales of approximately 3.5 million ZEVs per year from 2030 without a clear commitment towards a full phase-out. Toyota has instead proposed a “multipathway approach” arguing for the development of multiple types of powertrains and fuel, despite the limitations in carbon reduction of this approach. The company announced in May 2023 to create the ‘BEV Factory’ as a dedicated organisation to accelerate the development of ‘next generation BEVs’.¹⁵⁶ It is expected that EVs made in this factory will become available in 2027.

Toyota's Scope 1 and Scope 2 decarbonisation targets are subpar and lack urgency. Toyota's carbon reduction goals are centred around its pledges to adopt 100% renewable energy in its US sites by 2035, and reach carbon neutrality in its manufacturing plants globally by 2035. Toyota has made no tangible commitments in steel decarbonisation and material use reduction and efficiency that meet minimum expectations, with the exception of its commendable energy storage solution with repurposed EV batteries which has one of the most ambitious scales among the major carmakers.

Toyota's performance places it as the worst major carmaker on the chart in terms of electrification and decarbonisation efforts. There is a pressing need for Toyota to amp up its ambition level across all criteria and areas, and to show a clear vision towards a zero emission future by increasing its ZEV sales as well as articulating tangible goals for decarbonising its vehicles and supply chain with clear dates.

Phase-out of ICE vehicles		subscore
Toyota's ZEV proportion is among the absolute lowest at 0.24% in 2022, showcasing a slight but dissatisfactory increase from 0.18% the year before. The ZEV proportion has slowly increased over the past five years but the growth rate is worryingly slow, as represented by Toyota's CAGR of 62.31%. Toyota sold 23,251 units of ZEVs in 2022 — a number that is a slight but insignificant improvement from the 17,462 units that it sold in 2021.	Percentage of ZEV sales (2022)	0.20
	Percentage of ZEV sales (2018-2022)	0.08
	CAGR for ZEV sales (2018-2022)	0
Toyota sells modest volumes of ZEVs in Japan and the US.	Market concentration in ICE vehicle holdout markets	0.77
Toyota has announced its target to sell 3.5 million “all-electric vehicles” annually starting in 2030. ¹⁵⁷ Toyota has not committed to a full phase-out of ICE vehicles in any other jurisdictions besides Western Europe by 2035, which merely complies with regulation. ¹⁵⁸ Toyota only sold 50,000 EVs from January to July in 2023, a long way to go to meet their target of selling 1.5 million a year in 2026.	ICE vehicles phase-out plan	6.32

In California, Toyota offers renewable charging options for its Prius Prime and RAV4 Prime owners through offset schemes. ^{159,160} In Japan, the company offers a range of home charging options through its Green Charge scheme that include construction and installation, alongside options to purchase renewable electricity. ¹⁶¹ This service is aimed at individuals and parties who are willing to invest in building the systems, but less so the broader public.	Renewable energy charging	0.5
Supply chain decarbonisation		
Scope 1 and 2		
Toyota's use of renewable energy stands at 13%, which is an increase of only 2% from the last official report with a target of a mere 25% set for 2025. ⁶⁹ Toyota has set a target to reduce carbon emissions by 68% by 2035 compared to 2019. ¹⁶² In its US sites, Toyota has pledged to adopt 100% renewable energy by 2035. ⁶⁹	Renewable energy commitments	0
	Carbon reduction targets	1
Scope 3: purchased goods and services		
Toyota has disclosed its Scope 3 purchased goods and services emissions data in its official report and on the CDP database. The company has set a goal of eliminating all carbon emission throughout the entire vehicle lifecycle by 2050, with an interim goal of a 30% reduction by 2030 compared to 2019.	Disclosure and targets	3
Following the last year, there is no evidence that Toyota has any mention of their steel decarbonisation plans. Toyota's low-carbon steel partnership with Kobe Steel is discounted as it relates to the racing car segment of Toyota's production. ¹⁶³ The company has not set any targets for the usage of secondary steel.	Steel decarbonisation	1
In 2022, SUVs accounted for 37% of Toyota's total sales and that figure has been steadily rising for the past five years.	SUV share	-1
Resource reduction and efficiency		
Although Toyota discloses its raw material use, the company has not set specific targets to reduce its raw material use.	Targets on raw material reduction	0
Although Toyota discloses the overall percentage of recycled materials, the company has not set specific targets to increase the percentage of secondary materials used in production.	Secondary material usage	0
Toyota, in partnership with JERA, is aiming to build 100,000kWh of energy storage system in the mid-2020s by reusing EV batteries. ¹⁶⁴ Toyota also collaborates with Redwood Materials to create a closed-loop supply chain for EV batteries in North America. ¹⁶⁵ In 2021, 41,366 units of drive batteries were recycled. ¹⁶⁶	EV batteries – reuse and recycling	1
Deductions		
Toyota received a score of D by LobbyMap, due to its history of negative lobbying and active involvement in regressive trade associations. ¹⁶⁷	Negative climate lobbying	-0.5

Company profile: Volkswagen

2022 Market Share: 9.72%

Overall score	Phase-out of ICE vehicles	Supply chain decarbonisation	Resource reduction and efficiency	Deductions
26.6	19.1	6.0	2.0	-0.5

Percentage of ZEV sales in 2022: 7.29%

General Profile

As a proportion of total sales, Volkswagen's ZEV sales reached above the 1%-mark in 2020 which can be considered late for a carmaker that had a relatively early entry into the EV market. In the span of three years from 2020 to 2022, Volkswagen attained a 77.29% ZEV proportion and its growth trajectory is a promising trend that shows the capability of Volkswagen to achieve a swift and momentous electrification. Volkswagen Group targets ZEV sales to reach 60% in Europe and 50% globally by 2030, with no specific targets for China and the US.

Volkswagen has set appropriate goals for Scope 1 and Scope 2 decarbonisation. Its Scope 3 purchased goods and service emissions disclosure is up to par relative to other carmakers, but its reduction targets need to be clearer, more ambitious, and sharpened. Volkswagen's steel decarbonisation commitments are severely lacking, but the company's recognition of steel as an important area to decarbonise shows at least a level of awareness that nonetheless needs prompt action. Volkswagen likewise lacks targets to reduce the consumption of raw materials but has made some strides towards reducing the use and increasing the efficiency of secondary materials. For its failure to adequately engage with climate policies, Volkswagen is deducted 0.5 points.

Volkswagen's performance is slightly better than average but it needs to take prompt action to improve its ICE phase-out plans and focus on steel decarbonisation.

Phase-out of ICE vehicles		subscore
Volkswagen achieved a 7.29% sales proportion of ZEVs and sold 563,094 units of ZEVs in 2022. In absolute numbers, Volkswagen is one of the carmakers that sold the most ZEVs in 2022 and is unrivalled by fellow European carmakers. Volkswagen's ZEV sales saw an accelerating rise between 2018 and 2021. Its ZEV growth from 2021 and 2022 was more modest and can be attributed to its already high ZEV sales numbers. Volkswagen has a CAGR of 136.40%.	Percentage of ZEV sales (2022)	6.07
	Percentage of ZEV sales (2018-2022)	1.96
	CAGR for ZEV sales (2018-2022)	2.5
Although around nine out of ten of Volkswagen's ZEVs in 2022 were sold in either China or Europe, it still has modest sales in Australia, Canada, Japan, South Korea, Turkey, and the US.	Market concentration in ICE vehicle holdout markets	2.31
Volkswagen targets ZEV sales to comprise 60% of total sales in Europe and 50% globally by 2030, as stated in the company's NEW AUTO strategy. ^{168,169}	ICE vehicles phase-out plan	4.52
Volkswagen offers the "Naturstrom" renewable charging option to its users in Germany. The energy is from power plants in Central and Western Europe. ¹⁷⁰ Volkswagen also participates in the IONITY public charging program that operates throughout Europe. The green energy in IONITY comes mainly from offset schemes. ⁷⁹	Renewable energy charging	1.75

Supply chain decarbonisation		
Scope 1 and 2		
Volkswagen committed to reduce the absolute Scope 1 and Scope 2 carbon emissions by 50.4% by 2030 from a 2018 baseline. As of 2022, 54% of the energy at its production sites including China was from renewable sources. The company aims to achieve 100% renewable energy in Europe by 2023 and the same target is planned for global locations by 2030 except China. For China, Volkswagen is developing a roadmap with its suppliers and partners that will lead them to 100% renewable energy usage by 2030, but it is not definitive. ¹⁷¹	Renewable energy commitments	3
	Carbon reduction targets	1
Scope 3: purchased goods and services		
Volkswagen has disclosed its Scope 3 purchased goods and services emissions data in its official report and on the CDP database. However, the company has not set any clear targets for Scope 3 purchased goods and services.	Disclosure and targets	1
Volkswagen does not have targets related to steel decarbonisation. Nevertheless, Volkswagen has stated the importance of steel decarbonisation, declaring that it has started using lower-emission steel products in its sports and luxury segments. ¹⁷¹ The company has signed a contract with German steelmaker Salzgitter to supply low-carbon steel from 2025. ¹⁷² The company also announced that its subsidiary, Scania, is negotiating to collaborate with the startup H2 Green Steel. ¹⁷¹ The company does not disclose specific targets for secondary steel use.	Steel decarbonisation	2
In 2022, SUVs accounted for 44% of Volkswagen's total sales, a figure that has been steadily rising for the past five years.	SUV share	-1
Resource reduction and efficiency		
Volkswagen mentions the need to reduce the use of primary raw materials, but does not set specific targets for reducing overall raw material use. ¹⁷¹	Targets on raw material reduction	0
The company claims that each brand has targets and measures for the use of recycled materials in new vehicles. ¹⁷¹ However, the specifics of these targets have not been disclosed.	Secondary material usage	1
Volkswagen Group Components inaugurated a battery recycling facility at the Salzgitter site at the start of 2021. The facility has the capacity to recycle a maximum of 3,600 battery systems per year as a pilot project. The company claims the estimated carbon reduction is about 1.3 metric tons per 62 kWh battery manufactured using recycled material. ¹⁷¹	EV batteries – reuse and recycling	1
Deductions		
Volkswagen received a score of C by LobbyMap. ¹⁷³	Negative climate lobbying	-0.5

Appendix II:

Carmaker groups and marques

BMW Group	BMW Mini Rolls-Royce	Renault	Renault Dacia Renault Samsung Renault Korea Alpine	Great Wall Motor	Great Wall Haval ORA Tank WEY	Toyota	Daihatsu Lexus Toyota
Changan Automobile	Changan Deepal Oushang	Nissan	Nissan Datsun Infiniti	Honda Group	Honda Acura	Hyundai-Kia Group	Genesis Hyundai Kia
Mercedes-Benz Group	Mercedes-Benz Smart Mercedes-Maybach	SAIC Motor	IM Motors Maxus MG Rising Roewe Baojun Clever Wuling	Volkswagen	Audi Bentley Lamborghini Porsche SEAT Skoda Volkswagen Bugatti Cupra Jetta	Stellantis	Alfa Romeo Chrysler Citroën DS Fiat Jeep Lancia Maserati Opel Peugeot Vauxhall Abarth Dodge
Ford Group	Ford Lincoln	Suzuki	Suzuki	General Motors Group	BrightDrop Buick Cadillac Chevrolet GMC		

Appendix III: Tables and charts

Table 1.

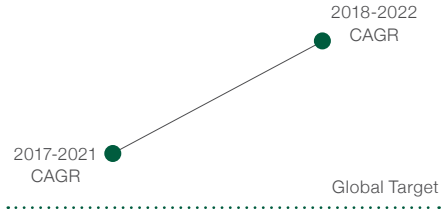
Targets on Scope 1 and Scope 2

Scope 1 and Scope 2		
Automaker	Renewable energy target	Carbon reduction target
BMW	2020: 100%	80% by 2030 2019 baseline
Changan	None	30% by 2030 2020 baseline
Ford	2035: 100%	76% by 2035 2017 baseline
General Motors	2035: 100%	72% by 2035 2018 baseline
Great Wall	None	No relevant targets
Honda	None	46% by 2030 2019 baseline
Hyundai-Kia	Hyundai: 100% by 2045 Kia: 100% by 2040	Hyundai: 45% by 2030, 2019 baseline Kia: 97% by 2045, 2019 baseline
Mercedes-Benz	2022: 100%	50% by 2030 2020 baseline
Nissan	None	30% by 2022 2005 baseline
Renault	2030: 70%	50% by 2030 (sites) 2019 baseline
SAIC	None	No relevant targets
Stellantis	100%	75% by 2030 2021 baseline
Suzuki	None	45% by 2030 2016 baseline
Toyota	None	68% by 2035 2019 baseline
Volkswagen	2030: 100%	50.4% by 2030 2018 baseline

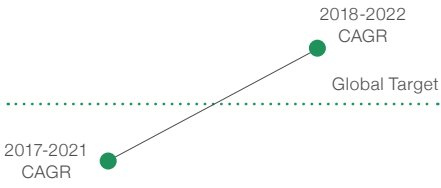
Figure 12.

Scoring criteria for CAGR

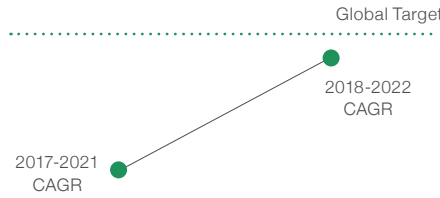
**Scenario 1:
two points awarded**



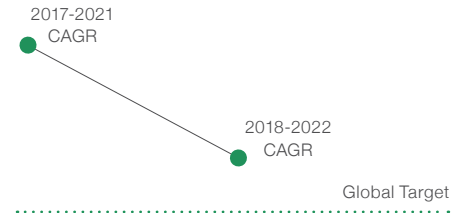
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one point awarded**



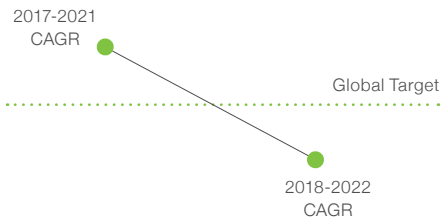
**Scenario 3:
one point awarded**



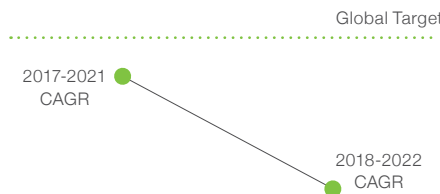
**Scenario 4:
one point awarded**



**Scenario 5:
zero points awarded**



**Scenario 6:
zero points awarded**



Endnotes

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