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Electric vehicle insurability: markets maturing

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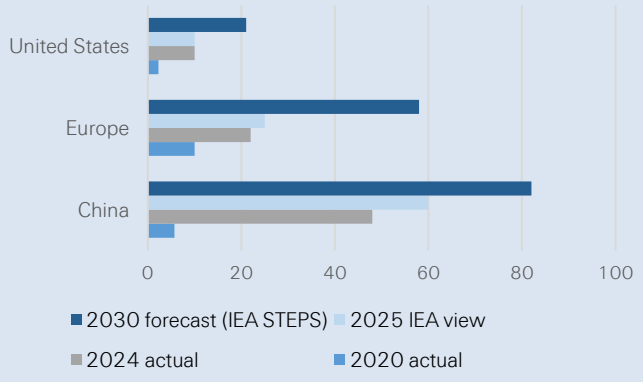
Improving data availability is helping alleviate some of the early profitability pressures experienced in electric vehicle insurance. In Norway, we find that insurers have contained the rise in overall loss ratios associated with EV adoption; in China, the "new energy vehicle" segment combined ratio declined to 105.7% in 2025 from 109% in 2023. Evidence suggests that segmented pricing has been a key lever, with insurers drawing on claims data, crash tests, spare parts costs and repair labour hours to inform underwriting. Enhancing repair ecosystems and promoting repair-friendly design can support these efforts. Rapid development cycles also heighten the importance of data access.

As electric vehicles (EV) markets worldwide mature,[1] insurers can draw on accumulated experience to address the early profitability challenges experienced. In several major markets, adoption is moving beyond the initial growth phase; the IEA expects EVs to account for the majority of new car sales in Europe and China by 2030 (see Figure 1). Emerging evidence continues to point to a central issue for insurer economics: higher repair costs for EVs compared with internal combustion engine vehicles (ICEV). Insurers in early-adopter markets have leveraged richer data to assess EV risk more accurately, strengthen repair networks, and refine pricing down to model level.

The evidence base, however, remains less developed than for ICEVs. Many EV architectures have been on the road for only a few model generations, and some recently launched models combine new battery chemistries, integrated body structures and evolving repair procedures. This reinforces the importance of access to relevant data and regularly updated underwriting practices internally.

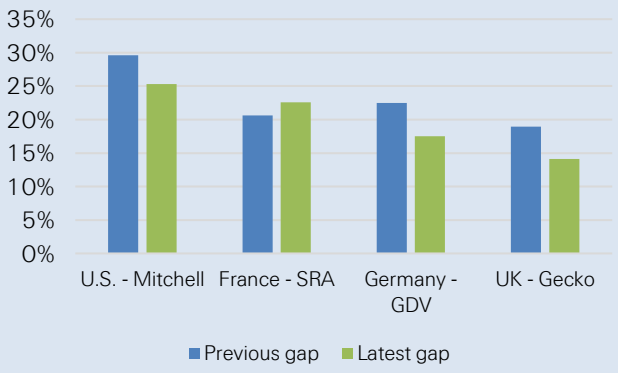
Figure 1: Share of EVs in new car sales (%)



Note: Electric vehicles include battery electric and plug-in hybrid electric; 2025 US numbers based on Q125. IEA STEPS is based on current policy frameworks.

Source: IEA[2]

Figure 2: Difference in average repair claims costs, EV vs ICEV, selected available markets



Source: Swiss Re Institute calculated from U.S. (Mitchell, 2025 & 2024), France (SRA) cost indices 2025 & 2024, Germany (GDV) comprehensive severity for EVs vs comparable ICEV (2020-2022 vs 2021-2023), UK (Gecko) gap between average cost to repair a BEV vs. petrol hybrid over the last 12 months (Jan 2025 & 2026), Metrics not comparable across markets.

Narrowing gap in repair costs

A key hurdle for EV insurance profitability has been repair costs. Evidence shows that EVs remain more expensive to repair than ICEVs, although the gap is narrowing (see Figure 2). As EV adoption scales up, repairers are gaining experience and improving diagnostics. Even so, we expect some cost differential to persist due to structural drivers, including batteries, high-voltage systems, ADAS sensors, software-driven diagnostics, and certified-repair requirements.

In the US, the average repairable loss severity for battery electric vehicles was roughly 25% higher than for ICEVs in 2025, down from around 30% in 2024, Mitchell reports.[3] The firm attributes this to more complex diagnostics and calibrations, as well as the increased use of parking sensors (advanced driver-assistance systems, or ADAS), cameras, and radar units, alongside greater electrical complexity. While these components are also present in newer ICEVs, EVs tend to feature them in higher concentrations, which can materially increase overall repair costs.

In Germany, comprehensive claims for EVs were 15-20% more costly than for comparable ICEVs over 2021-23, GDV found, down from 20-25% over 2020-22.[4] GDV links this improvement to increasing market maturity, with more EVs on the road and greater experience among repairers, towing companies, fire services, and claims handlers.

In France, data indicates that EV repair costs were about 23% higher than for petrol ICEVs in 2025.[5] France's Sécurité et Réparation Automobiles (SRA) attributes this to EVs being heavier, made out of complex materials such as aluminium and composites, as well as EV-specific parts such as cables and batteries. Claims also tend to involve additional time for safety procedures and rely more on certified repair networks.

In the UK, battery electric vehicle repair costs were 25% higher than those for ICEVs, with repair times 14% longer, according to Thatcham's 2023 report.[6] 2026 data for the UK by Gecko Risk shows that the gap between the average cost to repair a battery electric vehicle vs. petrol hybrid has narrowed as professionals gain experience with the technology.[7]

In Norway, a study found EV accidental-damage severity to be around 21% higher than for ICEVs, but bodily-injury severity around 19% lower, so the overall picture is mixed. The study, published in British Actuarial Journal, used Norwegian Public Roads Administration accident data for 2020-2023, supplemented with severity assumptions from HLDI, ABI and Guy Carpenter claims data.[8]

Usage patterns key for loss frequency

Loss frequency of EVs does not significantly differ from that of ICEVs once usage patterns are taken into account. In China, studies have found higher claims frequency, but this likely reflects the heavier usage of "new energy vehicles" (NEV)[9] in ride-hailing and logistics. The share of commercial vehicles is around 10 percentage points higher than for ICEVs. NEVs also tend to have a younger driver mix,[10] with the share of owners under 35 exceeding that of ICEV owners by 14 percentage points. In addition, some owners reportedly use vehicles for ride-hailing while insuring them as private-use cars, weakening premium adequacy and contributing to disputes.

Evidence from Europe is less clear on whether datasets refer solely to private-use vehicles or also include commercial fleets, but it does not indicate higher loss frequency for EVs—if anything, the opposite. Insurers in France report that accident frequency is not higher for EVs.[11] In Germany, full-comprehensive claim frequency for EVs was in fact 10-15% lower than for comparable ICEVs, a GDV paired-model study found.[12] Similarly, Guy Carpenter's analysis of Norwegian Public Roads Administration data shows that while EVs perform worse in more complex road layouts such as roundabouts, their overall accident frequency per kilometer was 17% lower than that of ICE vehicles.[13]

Table 1: Effects on loss severity and frequency for EVs (selected factors)

Factor	Description	Effect on loss severity in EVs		Effect on loss frequency in EVs	
Advanced driver-assistance (ADAS)	Smart driving functions.	**Higher**, relative to old ICEVs	↑	**Lower**	↓
Repairability / integrated design	Harder to repair; mega-casting, integrated battery design.	**Higher**	↑	Little direct effect	→
Parts supply and repair network	Rely on authorized repair, with higher parts and labour costs.	**Higher** and often longer repair time	↑	Neutral	→
Fire hazard	Battery catching fire due to thermal runaway incidents.	**Higher**	↑	Comparable to ICE vehicles	→

Source: Swiss Re Institute based on literature review. Arrows indicate direction of effect: red = higher, green = lower, blue = neutral or mild.

Norway's profitability-first approach

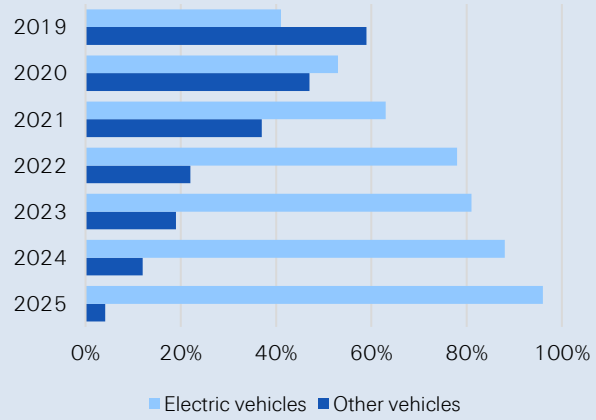
In some markets, insurers have responded to the profitability challenge by developing more refined pricing models, with segmentation across vehicle models and consumer risk profiles. This was one strategy adopted in Norway, which was able to curb the rise in overall loss ratios during the period of initial EV uptake.

Norway is the world's most developed EV market, with EVs accounting for 96% of new passenger car sales in 2025 (see Figure 3). In the early-adoption years, EV sales grew much faster than insurers' ability to price the associated risk accurately. This imbalance coincided with a rise in the overall motor loss ratio, from 58% in 2015 to 69% in 2018. While Norway does not publish a separate EV-specific underwriting result, qualitative disclosures from major insurers indicated claims inflation for EVs was outpacing prior price increases, as more expensive materials and limited spare parts availability drove repair costs higher.[14]

The levers insurers could control directly were pricing and more selective underwriting. Some insurers focused on improving rate adequacy and refining risk selection based on their underwriting strategies.[15] As experience and data improved, they were able to refine tariffing by vehicle and customer risk profiles.[16] At the same time, efforts were made to improve the efficiency of the claims-process and repair networks by improving access to original equipment manufacturer (OEM) repair information for workshops and developing platforms to improve efficiency and support cost control.[17,18]

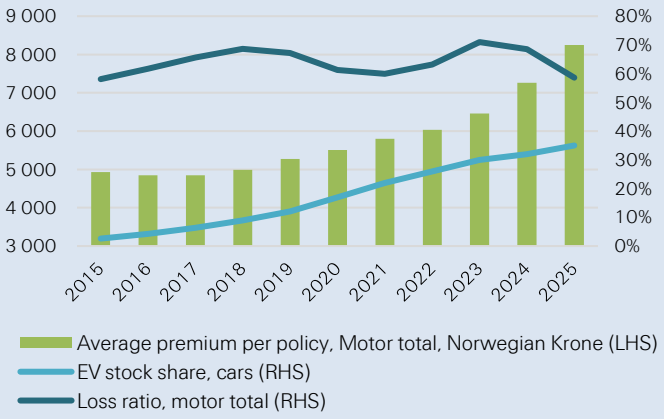
While repair-cost inflation remains an ongoing challenge, and the industry faced a broader increase in loss ratios due to economy-wide inflation and higher cost of imported motor spare parts in 2022-23, it returned to a healthier level in 2025, even with EVs accounting for over 30% of all passenger cars (see Figure 4).

Figure 3: New vehicle registration: market share of electric and other vehicles in Norway



Note: Other vehicles comprise petrol, diesel, plugin, non-plugin hybrid cars.
Source: OFV Statistik/ Norwegian Public Roads Administration

Figure 4: Norway: evolution of EV stock, total motor premiums and total motor claims, industry data



Source: Finance Norway, IEA, Swiss Re Institute. Norway does not publish an EV-only underwriting result, premiums and claims are for "motor total"

China's data-driven transition path

The profitability of China's NEV insurance market is improving, but still lagging the broader auto segment. China's approach increasingly combines regulatory guidance with more market-driven, risk-based pricing practices, with a strong focus on frequent data updates, feedback loops, and refined risk segmentation.

China's NEV insurance premiums grew by 35% in a single year (RMB 140.9bn in 2024 to RMB 190.0bn in 2025), lifting their share in the total auto premium pool from around 15% to 20% (see Table 2). The NEV combined ratio is gradually improving, from 109% in 2023 to about 107% in 2024 and an estimated 105.7% in 2025. However, this remains above the broader auto combined ratio of 97.9% in 2024.[19] The industry underwriting result is still negative, with losses of RMB 5.7bn in 2024 and RMB 5.6bn in 2025, official CAA-CBIT disclosures show.

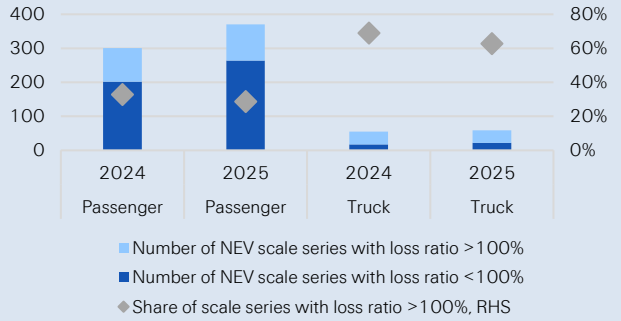
The core challenge is that average expected loss for an NEV is about 2.2x larger than that of ICEV, according to the official policy explainer. This reflects higher repair costs, a greater share of commercial vehicles, and a younger driver profile.[20] These pressures are not uniform across the segment. Certain NEV model series, particularly those characterised by integrated design, expensive original parts, and limited repair channels, can be high loss. Around one-third (143 of 429) of scale NEV model series had loss ratios above 100%, including 106 passenger and 37 truck series, CAA-CBIT 2025 disclosure shows. This highlights that profitability stress can extend even to the larger, statistically more stable portfolio of passenger cars (see Figure 5).[21]

Table 2: Key metrics for China's NEV insurance market

Metric	2024	2025	Change (YoY)
Insured NEVs, total (m)	31.05	43.58	40%
Insured NEVs, passenger (m)	*29.82*	*41.81*	*40%*
Insured NEVs, trucks (m)	*1.23*	*1.77*	*44%*
Premium income (RMB bn)	141	190	35%
Underwriting loss (RMB bn)	(5.7)	(5.6)	
NEV share of total auto premium – estimated	15%	20%	

Source: CAA, CBIT, NFRA, calculations by Swiss Re Institute

Figure 5: Number of scale NEV vehicles series, by loss ratio cluster, China



Source: CAA, CBIT, NFRA, Swiss Re Institute
Note: A scale NEV model series is a subset of at least 10,000 passenger vehicles or 5,000 trucks.

China's approach increasingly combines regulatory guidance with more market-driven, risk-based pricing practices. The policy response also reflects ongoing market feedback and accumulated underwriting experience. The January 2025 four-ministry reform package promotes insurance pricing more closely tied to actual repairability and loss severity, rather than simply by whether a vehicle is an NEV. [22] In China's regulated framework, official recommendations include a vehicle risk classification system based on low-speed crash test data, spare parts costs, and average repair labour hours at the model level, alongside more frequent updates to the industry's base premium, to reflect rapid product cycles and the significant variation in battery, power performance and safety configurations.

The reform also strengthens feedback loops between insurers, automakers and repair ecosystems. Regulators have begun sharing detailed findings on high-loss vehicle series with automakers, while insurers are developing more tailored products that better reflect usage intensity and driving behaviour. This includes a "basic plus variable" structure for NEVs, better suited to part-time commercial use and other higher-risk segments.

Scale advantages may help larger insurers respond more effectively, particularly through stronger data accumulation, repair-network coordination and claims management capabilities. Public disclosures in 2025 suggest that major insurers have achieved underwriting profitability in parts of their private passenger NEV books.[23,24] They attribute this to stronger data accumulation, better refined model-level pricing, closer OEM cooperation, more improved claims-cost control, and repairer-network scale advantages. Some improvement in combined ratios of the overall motor segment may also reflect lower expense ratios. At the same time, China's OEMs and insurers are piloting "design for insurability" initiatives, including modular battery design and more standardised repair protocols aimed at reducing total losses.[25]

Table 3: Profitability challenge and market or policy response

Challenge	Policy or market response
High repair costs and weak repair economics	Vehicle risk-classification system linked to low-speed crash tests, parts prices and repair labour hours; efforts to reduce repair costs; data sharing of high-loss series to automakers.
Usage mismatch between declared and actual vehicle use	Development of "basic plus variable" 'NEV insurance products; use of ride-hailing platform data; more refined pricing by usage pattern.
Pricing lags for new models and wide model-level risk variation	Regular updates to industry pure risk premiums; refined pricing standards for newly launched models; pricing that better reflects repairability differences.

Source: Swiss Re Institute based on literature review

China's NEV insurance market is therefore evolving from rapid expansion toward a more data-driven and repairability-focused underwriting model. The improving underwriting trends among larger insurers suggest that the market is gradually moving along the learning curve, supported by better data accumulation, more refined model-level pricing, more flexible product structures and closer insurer-OEM cooperation. Continued progress in repair ecosystems, data sharing and "design for insurability" initiatives could further improve profitability and insurability over time.

In Norway, insurers' initial response focused on pricing. While the market was large enough to expose the EV repair-cost problem early, it was too small in absolute terms and too dependent on foreign OEMs such as Tesla, Volkswagen, BMW and Nissan for local insurers to expect fast changes in vehicle repairability from manufacturers. By contrast, China combines far greater scale with a large base of domestic OEMs, the world's highest EV production, and an explicit policy framework linking insurer loss data, repair economics and model design, making upstream influence on repairability more feasible.

Designing EVs for insurability

Industry bodies across markets are calling for EVs to be designed with repairability in mind. The central challenge lies in batteries, which can account for around 40% of a new EV's value. Many battery packs are not designed for straightforward disassembly, visual damage criteria vary by manufacturer, and even minor casing damage can lead to full replacement rather than local repair. A comprehensive "design for insurability" regime could make EV damage more economical to diagnose, assess, and repair.

The Insurance Council of Australia argued in its 2024 EV industry paper that OEMs producing easily repairable battery packs could help address the repair-cost issue.[26] In the UK, Thatcham Research published an EV Blueprint in 2026 aimed at making EVs more repairable and extending their lifespan.[27]

Examples of repair-friendly vehicle architecture include replaceable battery casings and brackets, accessible high-voltage diagnostics, resettable emergency safety loops, and standalone placement of vulnerable high-voltage components, according to Thatcham Research.[28] OEMs have begun leveraging such frameworks to embed repair-friendly design early in the development process to reduce repair costs and support more affordable insurance.[29]

At the same time, the rapid expansion of Chinese EV exports into Europe, Latin America, Africa and the Middle East is bringing these insurability questions into sharper focus. While these vehicles are highly competitive on price, they may also create challenges around spare-parts availability, repair-network readiness and claims handling, as insurers are still building experience with many of the newer brands. Swiss Re will examine these dynamics further in upcoming work on the topic of EVs.

Bridging the gap: insurers, OEMs and customers

1. Insurers: Data from low-speed crashes and claims handling can feed directly into more accurate pricing and risk segmentation. Some markets already have frameworks for this: in the EU, data-access rules are designed to keep the aftermarket competitive and help improve repair affordability. European insurers are also calling for EU-wide standards on battery accessibility and repairability as part of the proposed circularity rules for vehicle design.[30] Some technical data can also be released to the public to support more informed purchase decisions by customers.
2. OEMs: The link between vehicle safety, repairability performance, insurance premium levels, and customer purchase decisions can create a feedback loop that incentivizes OEMs to improve repairability. Industry standards are already being developed in some areas through initiatives involving insurers, OEMs and other stakeholders. For example, the China Insurance Association's T/IAC 51.1-2024 low-speed structural crash standard was drafted by insurers including PICC, Ping An and CPIC, together with many OEMs such as BYD, Tesla Shanghai, Geely, GAC, Changan, NIO and others.[31] Potential future developments could include making repair information, diagnostics access, and battery-assessment methods more consistent across brands and markets.
3. Customers: As insurance becomes more segmented according to different risk profiles, consumers need to be better informed. A 2025 survey found that while nearly half of people in France know that EV and plug-in hybrid repairs cost more, only 22% believe this translates into higher insurance premiums, while 35% are unsure.[32] Buyers need this information to make informed decisions about comprehensive and collision coverage against a range of perils.

Maturing EV insurance markets are beginning to overcome the challenges with early adoption. Continued progress in repair network capabilities, and improved access to vehicle and claims data can support this trend. Larger insurers may have more data and claims-management resources to adopt these developments, but the broader market and customers stand to benefit from technical standards, greater transparency and stronger feedback loops between insurance outcomes and vehicle design.

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