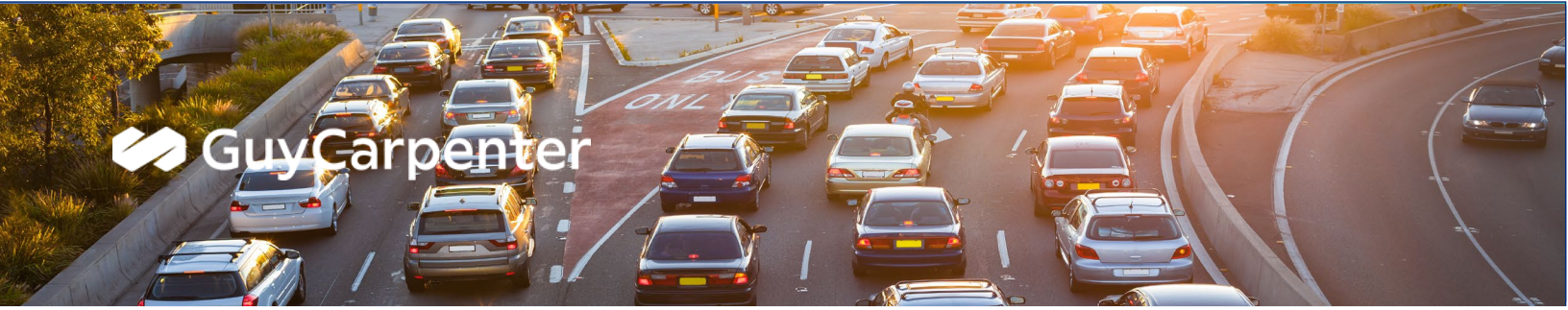

ANALYSIS OF ELECTRIC VEHICLE (EV) ACCIDENTS

In response to the pressing need for sustainable transportation, initiatives have been underway globally to promote the adoption of electric vehicles (EVs). This movement aims to conserve fossil fuels and facilitate a transition toward a net-zero emissions future and has resulted in remarkable growth of EV usage worldwide. There has been a lot of speculation around the change in risk profile for EVs, and any new risk is treated with caution until there is sufficient evidence to help understand the new risk profile. Our academic paper discusses this changing profile and is summarised here.

Utilising extensive data, we have quantified the frequency and severity of EV accidents in comparison to internal combustion engine vehicles (ICEVs). Our analysis encompasses data from Norway Norwegian Public Roads Administration (NRPA) spanning 2020 to 2023, a period marked by significant EV adoption, with 42% of road traffic accounted for by EVs and hybrids in 2023. We examined more than 2 million registered EVs, which collectively account for 28 billion kilometres of travel and more than 2,300 accidents.

Norway aspires to be the first country to ban the sale of new fossil-fuel-powered cars by the end of 2025, according to the IEA policy review. We have enriched this data with severity metrics from the HLDI institute in the US, ABI statistics in the UK and the proprietary Guy Carpenter motor claims database.

The risk profile of EVs differs from that of ICEVs in several key aspects. Evidence suggests that EV drivers tend to belong to higher-income households and are generally older and predominantly urban, according to the Gallup Poll (2024) and Department for Transport car ownership review (2023). With respect to the vehicle itself, the newer technology in EVs often includes advanced driver-assistance systems (ADAS), a simpler drivetrain and a lower centre of gravity due to the placement of heavier batteries. While disentangling these effects on accident frequency is complex, we have made adjustments to the data to normalise it for clarity.

Frequency

Our findings indicate a consistent reduction in accident frequency across all fuel types over time, attributed to advancements in vehicle safety, improved road infrastructure, and evolving driving patterns in the post-COVID era.

EV accident frequency is consistently lower than that of ICEVs, with an overall reduction of 17% across all years tested in our analysis.

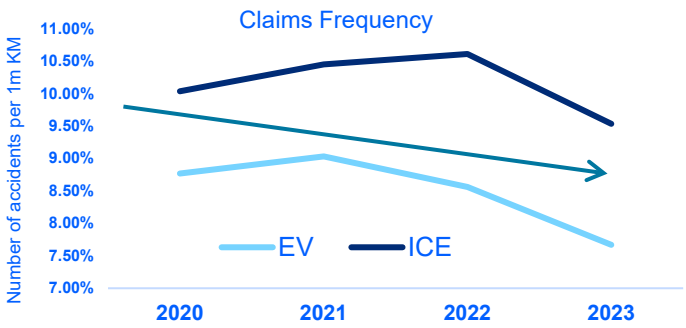

Figure 1: Claims frequency by fuel type

In our research, we analysed more than 100 categories from the NRPA data related to accident characteristics, looking for differentiating factors between EV and ICEV frequency propensities. The main factors are summarised in Figure 2.

It is important to note that EVs do not excel in every scenario. They demonstrate superior performance compared to ICEVs in predictable road conditions, such as single-car roads, and in adverse weather conditions, including nighttime and rainy conditions. However, they tend to perform less favourably in unpredictable situations, such as roundabouts and complex road layouts.

Severity

Regarding severity, the average number of vehicles involved in accidents is used as a proxy and is approximately 8% higher for EVs than for ICEVs. Variations exist depending on the specific characteristics of the accidents, with EVs generally having more vehicles in accidents in the majority of cases, but there are situations in which the number of vehicles involved is less than ICEVs, such as on roads with lower speed limits.

To further analyse the impact of different types of damage, we utilised data from the HLDI in the US, which collects accident data by type of damage and model type. We linked this data to fuel type and weight, creating fuel type pairs for comparison. For instance, we compared a petrol vehicle from the same manufacturer with its EV equivalent (e.g., the Hyundai Kona 4dr and the Hyundai Kona Electric 4dr). This approach ensures that our analysis compares equivalent ICEVs and EVs, isolating changes in weight and cost from manufacturer-specific factors.

The subsequent analysis illustrates the change in EV costs by head of damage.

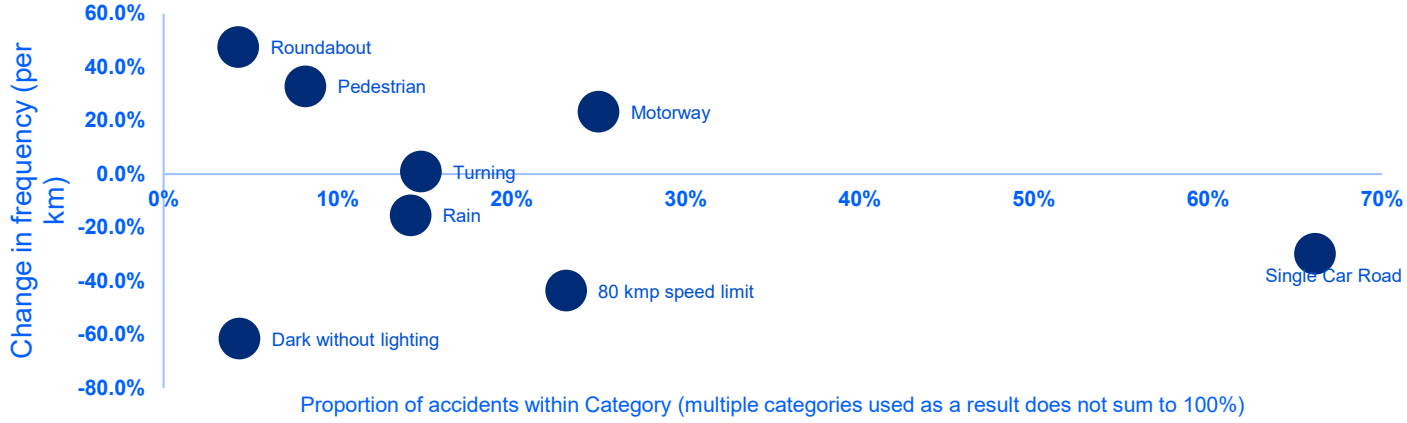

Figure 2: EC relative to ICEV frequency

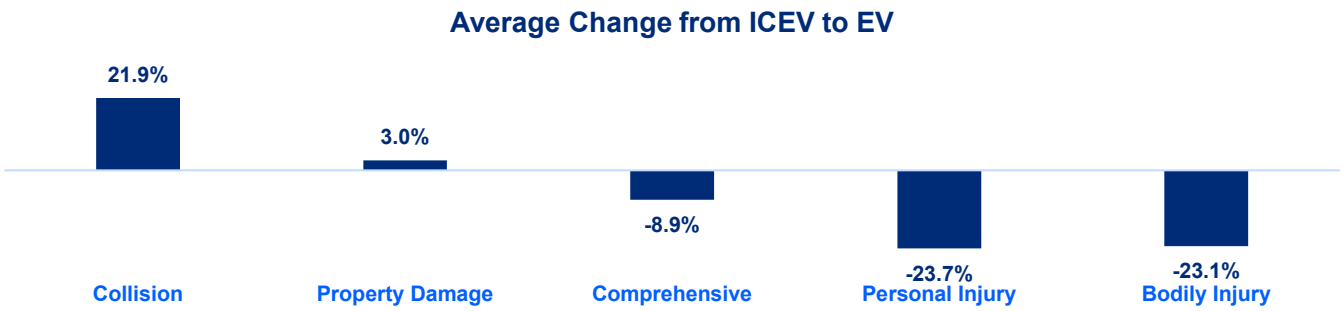

Figure 3: Average change from ICEV to EV

We employed ABI statistics to examine the proportion of claims by head of damage, revealing that, on average, the cost of claims for EVs and ICEVs is comparable.

However, focusing on larger claims, we adjusted the proportions by claim size using the proprietary Guy Carpenter motor claims database. Smaller claims typically involve a higher proportion of property damage, while larger claims are more likely to involve bodily injury. We simulated the claims distribution for each head of damage, reflecting these proportions.

Figure 4 shows the distribution of claims costs for EVs in comparison to ICEVs.

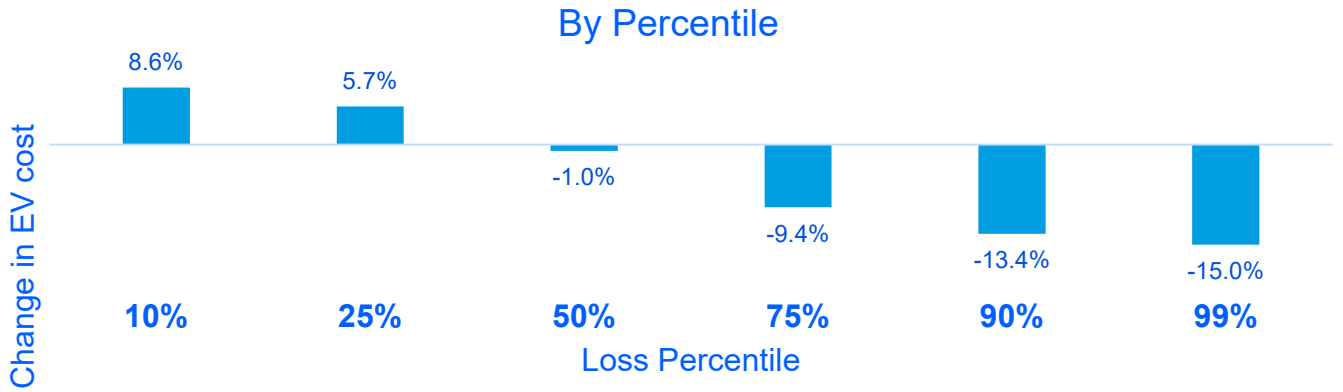

Figure 4: Change in EV cost

This shows that the larger claims decrease due to the injury element, and the smaller claims increase due to the damage element.

Guy Carpenter is working to improve the understanding of changing motor risks

The comparison of the frequency and severity of accidents involving EVs and ICEVs presents a complex and intriguing challenge, particularly when considering the variations in driver characteristics and technological factors.

This study has demonstrated that EVs experience a significant reduction in the frequency of accidents per kilometre driven compared to ICEVs.

However, the analysis of severity reveals a more complex picture, as different types of damage exhibit varying responses based on the fuel type of the vehicle involved. There has been an increase in smaller damage claims, while larger injury claims have shown a decline. This leaves the distribution of claims payments to change, increasing smaller claims alongside decreasing larger claims.

Given the greater unpredictability around outcomes for the most severe bodily injury claims, including the

continuing impact of changes in the long-term cost of care, this change in claims distribution has the potential to positively impact loss picks and to reassess the impact of portfolio composition on overall motor results. Guy Carpenter is helping clients by tailoring reinsurance strategies to reflect this changing nature of risk.

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About Guy Carpenter

Guy Carpenter, a business of Marsh McLennan (NYSE: MMC), is a leading global risk advisory and reinsurance specialist and broker. Marsh McLennan is a global leader in risk, strategy and people, advising clients in 130 countries across four businesses: Marsh, Guy Carpenter, Mercer and Oliver Wyman. With annual revenue of $24 billion and more than 90,000 colleagues, Marsh McLennan helps build the confidence to thrive through the power of perspective. For more information, visit guycarp.com, or follow on LinkedIn and X.