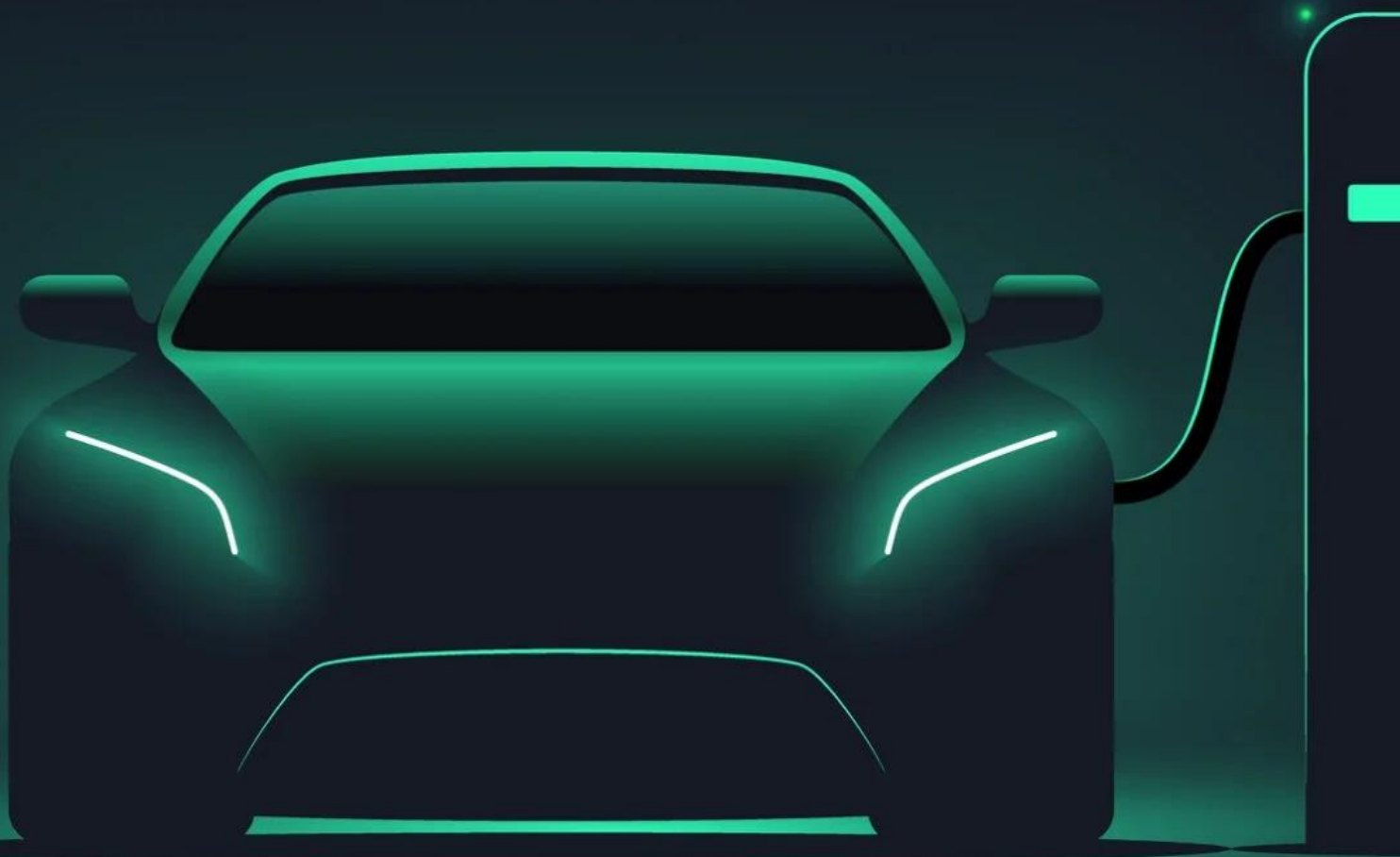


# Why the Electrification of Vehicles Holds a Large Threat for the Survival of Legacy Automotive Companies

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## Introduction

A rapid increase in fuel price catalysed by the invasion of Ukraine, international agreement at COP26 on the ban of combustion engine sales by 2040[1], and a 97% reduction in battery cost in the last 3 decades[2] has propelled automotive companies into a technological race for survival.

With almost 20 million passenger Electric Vehicle (EV) sales[3], the electric powertrain has demonstrated that it is here to stay. Currently these vehicles only represent 1.5% of the global fleet; however, due to decreasing battery costs, EVs are ready for mass adoption, and the critical question is who can increase production to meet the demand. Legacy automotive companies must make swift and aggressive actions towards electrification in order to compete for a share in the ever-engulfing slice over Internal Combustion Engines (ICE) vehicles.

This report will outline why EV adoption has occurred on a far shorter timeline than expected; why this technology shift results in added complexity and delays in the race towards electrification; and why lack of Vertical Integration and thus ability to scale fast, could be the final nail in the coffin for legacy automotive companies.

## The Accelerated Transition to Electrification

Recent strain and volatility on the oil and gas prices has incentivised western countries to detach their reliance on these commodities; and in March 2022, the cost per mile of an EV was 80% cheaper than ICE vehicles[4].

Electric vehicles are not only cheaper to run, but the battery cost, which currently accounts for a third of an EVs price tag[5], dropped by 89% from 2010 to 2020[6]. BloombergNEF estimates that the learning rate for batteries, defined as the percentage decrease in price for every doubling of output, is around 18%[7]. With 90% YoY production in 2021[8], yields a yearly decline of 16%. By 2023, battery cost will reach \$100/kWh and the production cost of an EV will be equal to that of an ICE vehicle[9]. This is the tipping point, where production and consumer costs are lower than ICE vehicles and mass adoption will occur.

Despite staggering drops in costs for both EV consumer and manufacturer, legacy companies are still extremely reluctant to cut ICE vehicle production. In August 2021, Ford, GM, and Stellantis announced a joint goal that 40-50% of their sales will be electric or hybrid vehicles by 2030[11]. However, battery costs will have further halved from the mass adoption tipping point to \$43/kWh. They have drastically underestimated EV adoption rates, relying on the “Laggards” to purchase half of their vehicles, who by definition are not majority consumer. GM, acknowledging their flawed transition, are now aiming to compress their development schedules for 12 of their 30 planned EVs and halving the development timeline of GMC’s Electric Pick-Up[12]. While these automakers may not be ready for 100% EV sales by 2030, the market will be.

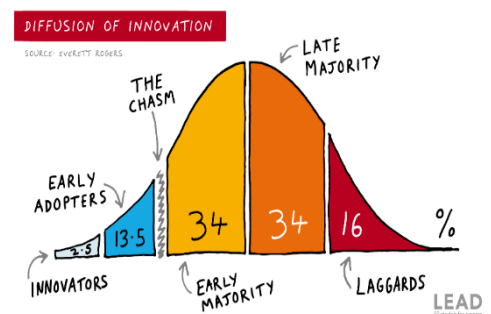


Figure 1 Popularised by Everett Rogers, the Diffusion of Innovation Graph [10]. Where a technological advancement leads to consumer adoption until the market share has saturated. For EVs, the question is not what the final market share over ICE vehicles will be, but over what timeline this occurs.

Figure 2 - The 2022 BMW 3 Series looks like an Ikea construction of off-the-shelf parts from hundreds of OEMs.

Tesla is a perfect demonstrator of why Vertical Integration succeeds in the automotive industry. Straubel, former CTO, confirms 90-95% of the Model S is made by Tesla after OEMs consistently failed to deliver on time[16]. In January 2018, Tesla shipped 2,400 cars in total, after promising investors more than double. Tesla is now producing 365,000 cars per quarter, a 54% increase YoY[17]. It is not just scalability, Tesla now have an operating margin of 18% which dwarfs Toyota and VW, the second and third largest companies by market cap, who achieved 7.5%[18] and 8.5%[19] respectively this quarter.

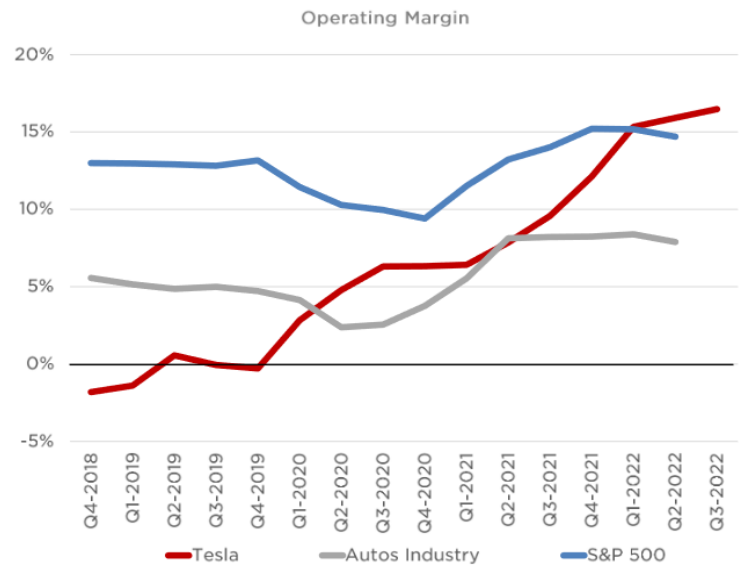


Figure 3 Operating Margins of the Automotive Industry vs Tesla.  
Taken from Tesla's Q3 Earnings Report (audited and unaudited)[16].

*"Supply chains were already tight, and the combination of war in Ukraine and a substantial Covid-19 outbreak in China has exacerbated this situation."*

*- Scottish Mortgage Investment Trust PLC[13]*

The fragility of supply chains has been highlighted recently by a number of events, from the global pandemic to recent geopolitical events. Tesla's insistence on vertical integration resulted in initially poor profitability but has since enabled immense scale whilst the rest of the industry has been in turmoil with the supply chain.

Legacy companies do not have the luxury of reducing their reliance on OEMs, since as Tesla demonstrates, vertical integration leads to inevitable production delays in early years, which they cannot afford.

## Conclusion

The automotive market is experiencing a compulsory transition fuelled by economic, climate, and geopolitical pressures. As EV production costs meet that of ICE vehicles, and low consumer costs incentivise, mass adoption of EVs is imminent. Electrification has introduced several innovations, which has moved the technology away from engines and power transmissions and towards electric powertrains, batteries, and software. Legacy companies' lack of inhouse expertise has caused them to heavily invest in R&D in an attempt to accelerate their development time and acquire technical knowledge during the transition. If this fails to prosper in time, they must increase their reliance on OEM suppliers, further detaching from vertical integration, accelerating their initial production output at the detriment of long-term profitability and market dominance. Electrification may serve as a grand reset for the automotive market.

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