



Frequently asked questions

Stranded Engines report

June 2021

This report is a result of a financial analysis modeling possible future scenarios under certain assumptions, under no circumstances should this be considered as investment or financial advice. If you are seeking to invest - please use professional legal, financial or other advice from a certified body.

1. Is the analysis based on European car sales only? Their future profits and valuations will be affected by their activities outside Europe too.

Even though only carmakers with large sales in Europe were chosen for this study, Profundo analysis is based on their global sales and therefore takes into account activities outside of Europe.

2. BEV margins in 2035 are higher than current ICE margins, is it credible given the expected competition between carmakers?

Looking at carmaker announcements, they often expect higher margins (two digit margins) in the future compared to today. E.g. Volkswagen expects that BEV profitability will reach parity with ICE ahead of their initial schedule (2024-2025).

Moreover, broader market trends show carmaker strategies shifting toward premium and high-margin vehicles, across all powertrains. Instead of fighting on price and market share, carmakers are expected to keep close control on prices and fight on quality, efficiency and additional digital services. In view of this, many carmakers are likely to reach higher margins in the coming 3-5 years.

3. Is it credible to have negative margins in the future? Carmakers could keep ICE sales in developing countries and relocate production in these countries.

Given the larger margin expected on BEV, carmakers have the opportunity to tolerate low or even slightly negative operating margins on ICE. Moreover, negative operating margins are mainly an accounting consequence resulting from past investments: previous expenses to build ICE production capacity are still amortised each year. This means that the amortisation of these investments is still accounted for, while revenues are falling (as ICE sales are expected to decrease in the future). This leads to negative operating margins in accounting terms but to a

positive cash flow as some sales revenues would still be occurring. All in all, with lower volumes and weight of the ICE business in the enterprise value, carmakers may tolerate these negative margins in the short term in order to maintain market share. Some carmakers could choose to keep part or all of their production in Europe for exports if it is cheaper or easier than building new plants and supply chains from scratch and training new workforce in new markets.

4. What is the impact of the high commodity price and supply chain crises (Ukraine war, Covid, chip crisis, ...)?

The report assumes a 5% increase of production cost in 2022 due to the commodity price crisis that impacts both electric cars (with nickel prices that momentarily surged and high lithium prices) and ICEs (palladium and platinum used for catalytic converters). This increase is expected to be limited as carmakers are known to use market instruments (forward contracts, swaps, hedges and price protection) to shield against volatile raw material prices.

Nevertheless, carmakers are currently in a position where they have high pricing power: due to the semiconductor crisis, car production was relatively low in 2021 and did not meet demand, leading to longer delivery times and undersupply in the market. In this context and given that customers expect some impact from the Ukraine crisis, Profundo expects that carmakers would be able to increase their sales price in 2022 by 3% to protect part of their margins.

5. Why is the potential increase of market values so large (more than 100%)? Does that mean T&E expects carmakers' value to increase in the future, no matter their strategies?

Based on theoretical calculation (discounted cash flow methodology), equity value of carmakers appears much larger than the current market capitalisation. This difference can be explained by the fact that investors apply risk factors to their valuation in order to account for execution risks or expected future carbon liability. This means investors are waiting for carmakers to prove that they are able to deliver on their decarbonisation promises before raising their valuation. It also shows that the market currently has low trust and sees a low outlook for carmakers as they risk being burdened in the future by their scope 3 emissions. The successful execution of a faster EV transition appears to be unlocking large market value growth potential as this results in a greatly reduced carbon liability in respect to scope 3 emissions. The slower transition pathway also has positive potential in theory as it results in an increasing EV share compared to today, but in practice, it could reduce investors' trust and increase risks (such as loss of market share), so a slower transition would likely lead to a long term loss in market value.

6. BMW appears to have a larger potential growth of its market valuation than other carmakers in the quick case, what does explain this larger potential?

The most important factor is the weighted average cost of capital (WACC) that is used to discount the cash flows. BMW has the second lowest WACC (4.78%), after Toyota, which means from a discounted cash flow analysis perspective, that the cash they will earn in the future is worth more

than, for example Volvo Cars which has a 7.2% WACC. The reason why Volvo has higher WACC is that Volvo has lower debt and higher equity. It may sound counterintuitive but from a valuation perspective, financing a company with debt lowers the overall cost of capital because debt is cheaper than equity. For instance, if a bank expects 1-2% return from the debt it provides but investors in the equity (shareholders) expect a much higher return as they take much more risk.

7. Why does Toyota have such a large market value today compared to other carmakers?

Toyota has benefitted for years from large global sales volumes, high operating margins, efficient supply chain management and an early hybridisation strategy. Therefore, investors appear to discount low execution risks. Moreover, the discounted cash flow analysis is sensitive to the discount rate used to weight future cash flows and Toyota benefits from the lowest discount rate due to its low weighted average cost of capital.

Nevertheless, Profundo shows that, despite higher current market capitalisation, Toyota appears to be the carmaker with the larger risk in the EV transition. Firstly, Toyota's current EV strategy is unambitious compared to its peers, Toyota was found to be the laggard of T&E's EV readiness index ranking¹ published in June 2021. Profundo shows that this low ambition implies the lowest growth potential for the carmaker's equity value. If Toyota fails to meet its already low commitments and adopt a slow EV transition pace, Profundo shows that its market value could even decrease. Then, if carbon liabilities are included in the model, the Japanese company appears to be at even higher risk due to the large size of its global ICE fleet.

8. As most large carmakers are already shifting their strategies toward more EVs, can't we assume that OEMs with slow transition plans would have more market share and pricing power in the ICE market? Isn't this an advantage?

Laggards in the EV transition such as Toyota could have a higher share of the ICE market in the future. But it is a major risk as the majority of consumers will likely prefer to purchase a BEV when they reach price parity, on average, after 2027. This means that laggards in the transition will lose bargaining power and would not be able to keep the same sales prices and margins even if they have a large share of the ICE market. As regulations progressively phase-out ICE in all markets, laggards will need to increase their EV sales at the last minute and would face major execution risks. For instance, laggards would have a technology and knowledge gap as they will not have learned from past products or they could risk relying on unsecured battery materials and volatile commodity prices as frontrunners establish long term contracts and vertical integration.

¹

<https://www.transportenvironment.org/discover/without-strict-co2-targets-carmakers-miles-behind-on-electric/>

9. Is it possible that switching to BEVs could lead to losses in market share, pricing power (and margins) due to increased competition from Chinese/low-cost BEV carmakers compared to ICE?

On the one hand, carmakers with low BEV sales that would sell products without any technological edge could lose market share when faced with low-cost competitors and would not be able to maintain high sales prices and high margins. However, this could also happen to carmakers in the ICE segment.

On the other hand, carmakers that anticipate this competition and are early to develop cutting edge BEV products may be able to stay ahead of the competition. Carmakers with an early EV strategy will have more time to develop and improve their technology in order to save costs or gain a technological advantage. Selling BEVs with efficient technologies and added value at a competitive cost will be key for carmakers. The execution of a successful technological strategy requires time and anticipation, so carmakers with early and ambitious involvement in the EV transition will be better prepared to face competition and keep high margins. Profundo does not expect BEV operational margins to decrease before 2035 (which is the limit used for the analysis) as the impact of competition will be mainly after the phase-out of ICE in major markets such as Europe.

10. Battery material availability is identified by the market as one of the main execution risks, isn't there a risk that high battery material prices this decade lead to much lower margins than expected in this study?

Sufficient battery raw material and extraction/refining capacity are available to accelerate BEV growth in the short term². Key is to ensure that the required raw materials reach the EU market and are secured by European carmakers given the global competition. Joint ventures, partnerships, innovative procurement and other ways of collaborating directly with the primary and secondary suppliers of metals is key.

In the mid to long term, carmakers with more robust industrial strategies to back up their EV plans are also the ones that have a more vertically integrated supply chain or long term contracts with material suppliers in order to secure the materials required. Carmakers with a robust EV industrial strategy are likely to work closely with the primary and secondary raw materials suppliers (e.g. through long-term contracts). Such relationships are likely to result in a ramp-up of material extraction and refining, as this will provide actors within the metal industry with a more precise forecast on the volume requirements from carmakers. Carmakers may also choose to vertically integrate key material supply chains (e.g. Tesla that consider to set-up its own lithium production³), thus shielding further against volatility. Conversely, carmakers with low ambition and no effort to secure their material supply will be facing more price or volume uncertainty and higher operational risks.

²

<https://www.transportenvironment.org/discover/enough-raw-metals-to-make-14-million-electric-cars-globally-in-2023-study/>

³ <https://www.cnn.com/2022/04/08/elon-musk-tesla-may-have-get-into-mining-refining-lithium-directly.html>

Current high battery material prices are mainly caused by short term disruption (Covid that impacted the supply chain) or by speculation (short squeeze on nickel for instance). These temporarily high prices are expected to come back to more sustainable levels soon. In their 2021 Lithium-Ion Battery Price Survey, BloombergNEF expected battery prices to peak in 2022 before decreasing again. While this would delay the point at which battery pack prices cross the \$100/kWh⁴ back by two years, it will not change the overall downward cost trend. Moreover, carmakers are also expected to adapt their battery strategies, for instance by switching to more LFP batteries to keep reducing their average prices. In 2021, the LFP chemistry was 15% of EV battery demand, doubling from 7% in 2020⁵.

11. Do you take into account change in market share in the analysis?

The model does not account for major changes in market share between carmakers. The 6 carmakers studied are expected to adapt to growing competition and are assumed to succeed in maintaining their market share. Nevertheless, some specific examples show that carmakers could cope with decreasing overall sales by changing their strategies. For instance, Volksagen recently announced a strategic change to divert from the mass market toward more premium products and declared "We are (more focused) on quality and on margins, rather than on volume and market share."⁶. This appears to be a growing trend in the market, carmakers expect lower overall car sales as some consumers in Europe or other developed markets tend to transition toward car sharing or public transportation. Therefore, carmakers are forecast to adjust their business models and focus less on high volume low margin products and market share in the future.

Nevertheless, sales prices used in Profundo's model are based on the expectation of a growing competition in the BEV business with carmakers stabilizing their margins and losing pricing power in the future. After a period of moderate competition and high pricing power in the 2020s (leading to an increase in operational margins), carmakers will need to keep constant margins in the 2030s.

12. The profit margin of BEV will be higher long term than that of ICEs, but the sales price of BEVs will be significantly below that of ICEs. Could carmakers have a gain in profitability but a reduction in profit in absolute terms?

The decrease in BEV sales prices in the long run are enabled by a decrease in production costs as carmakers optimize their EV production and benefit from lower battery cost as Bloomberg expected the average battery pack price to reach \$58/kWh in 2030 and \$45/kWh in 2035, a fall of 67% from 2020⁷. This means that, even though sales prices are lower, even lower production costs enable larger profit margins. Overall profits are expected to further increase with increasing BEV

⁴ \$100/kWh is the point at which BloombergNEF expects BEVs will start to reach price parity with ICE

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<https://iea.blob.core.windows.net/assets/e0d2081d-487d-4818-8c59-69b638969f9e/GlobalElectricVehicleOutlook2022.pdf>

⁶ <https://europe.autonews.com/automakers/vw-cutting-60-combustion-cars-focus-premium-market>

⁷ <https://www.transportenvironment.org/discover/hitting-the-ev-inflection-point/>

volumes. Only carmakers that fail to ramp-up their BEV sales would suffer from loss in profitability as they would sell increasingly low margin ICEs.