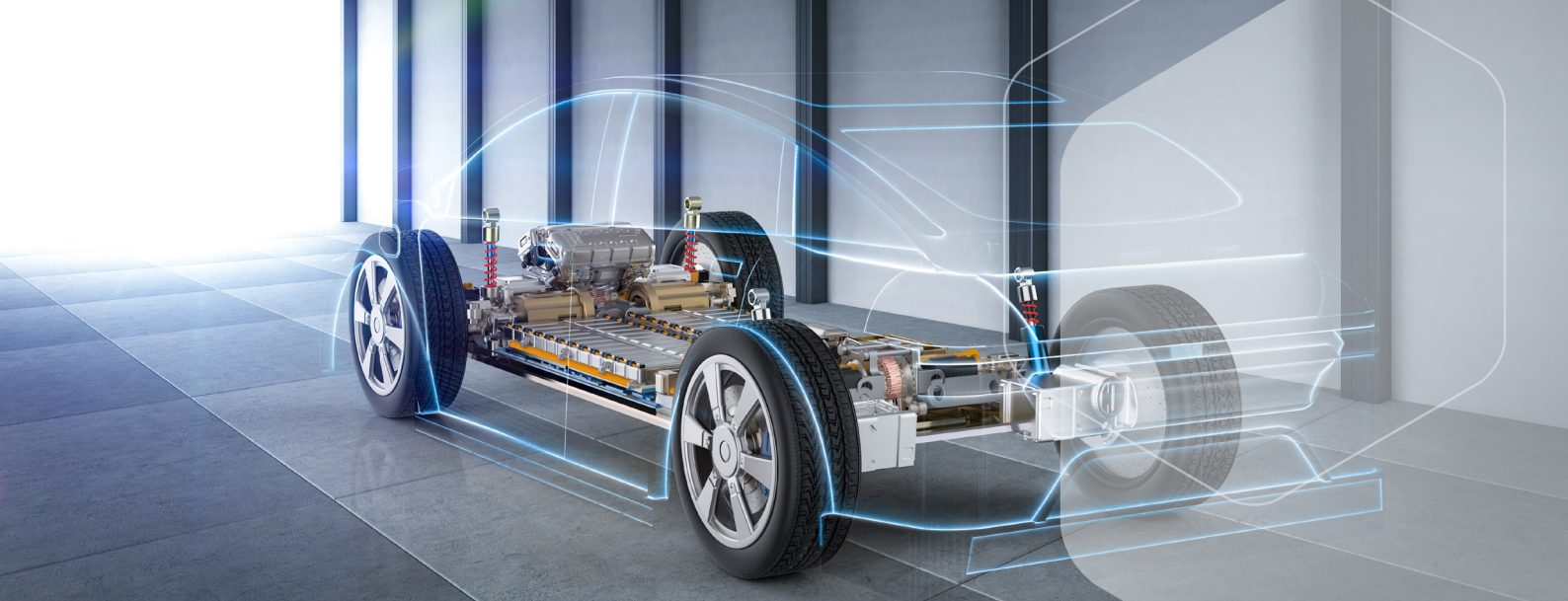




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BERYLLS STRATEGY ADVISORS

BERYLLS E-MOBILITY SUPPLIER SURVEY 2023



AGENDA

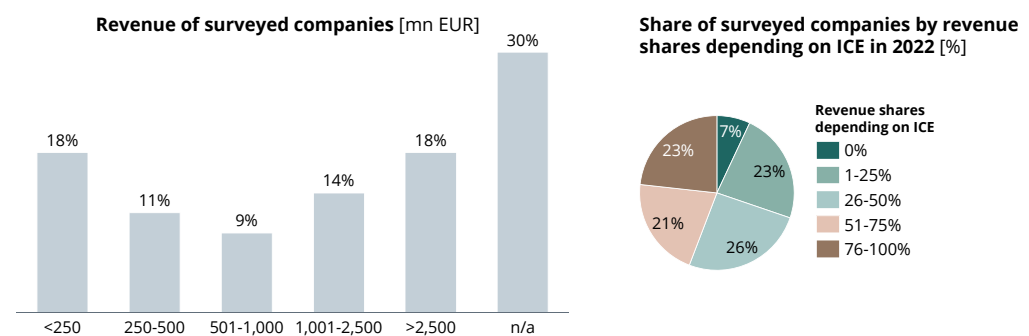
- 1 Suppliers are generally optimistic about the E-mobility transformation
- 2 How suppliers' long-term hopes meet today's reality
- 3 Key success factors for mastering the transformation

SUPPLIERS ARE GENERALLY OPTIMISTIC ABOUT THE E-MOBILITY TRANSFORMATION

Berylls E-mobility Supplier Survey 2023

We interviewed executives from 44 European automotive suppliers from various sectors (e.g. powertrain, E/E systems, interior, body, software, machining) and of different sizes (incl. several TOP 100 supplier), most of which are dependent on the internal combustion engine for a significant proportion of their sales. The main goal was to assess the impact of E-mobility on their respective businesses and assess how prepared they are for this major transformation.

Figure 1: Range of surveyed companies

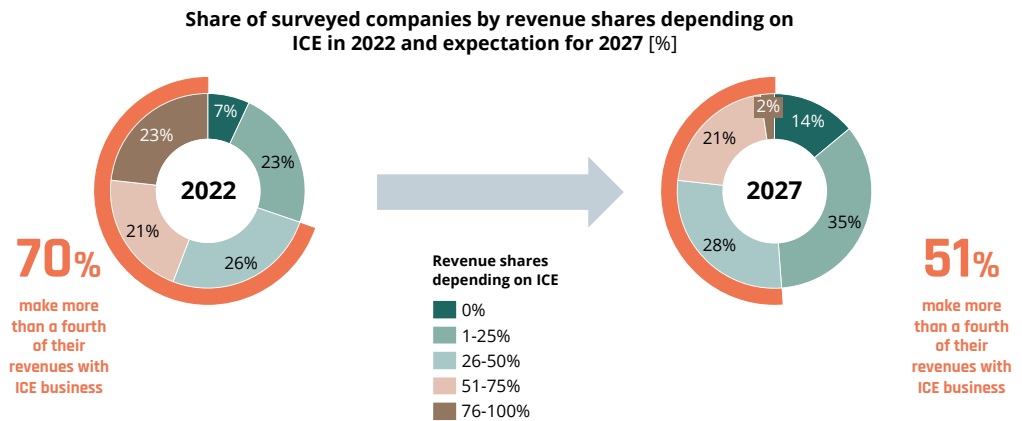


Source: Berylls Strategy Advisors

Supplier industry in transformation

The survey highlights the supplier industry's continuing strong dependence on the ICE drivetrain, with 70% of those surveyed generating more than a quarter of their revenue from ICE-related business. It is no surprise that this picture will change significantly over the next few years as electrification rates rise and the E-mobility transformation gains further traction.

Figure 2: Suppliers' share of ICE-dependent revenue



Source: Berylls Strategy Advisors

Against this background, companies that currently depend on ICE business for at least 25% of their revenue expect the proportion to fall to 51% over the next five years. This also means that 49% will not depend on the combustion engine at all or only to a small extent.

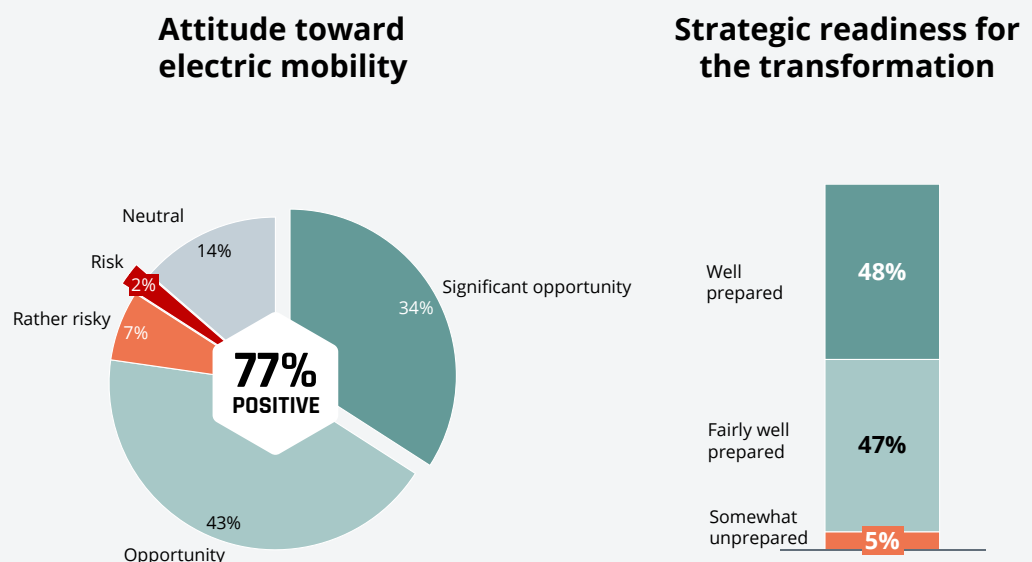
We can therefore draw two main conclusions:

- » *The supplier industry is already experiencing significant transformation, with most of those surveyed reducing their ICE dependence by changing their product portfolio*
- » *Many suppliers still expect to rely heavily on ICE business in five years' time*

Suppliers are optimistic about the transformation toward E-mobility

Almost 80% of those surveyed regard E-mobility as an opportunity, despite the high proportion that still expect to rely mostly on ICE-related business in five years' time (see Figure 3). Meanwhile, fewer than 10% see E-mobility as a risk, with an overwhelming 95% believing they are well prepared or fairly well prepared strategically for this challenge.

Figure 3: Electric mobility – opportunity or risk?



Source: Berylls Strategy Advisors

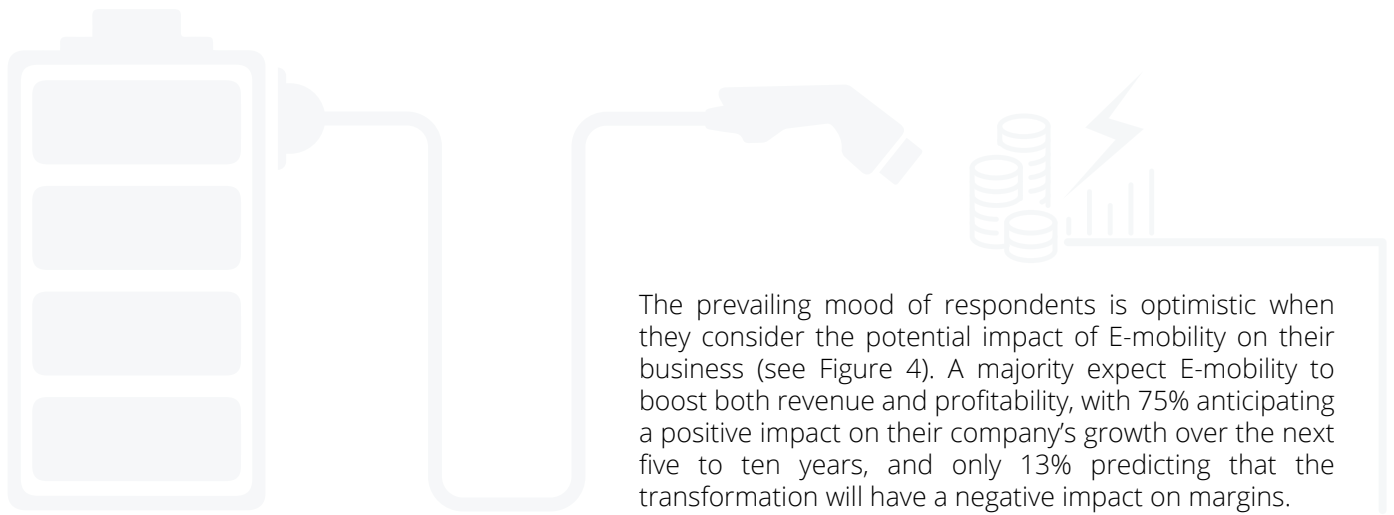
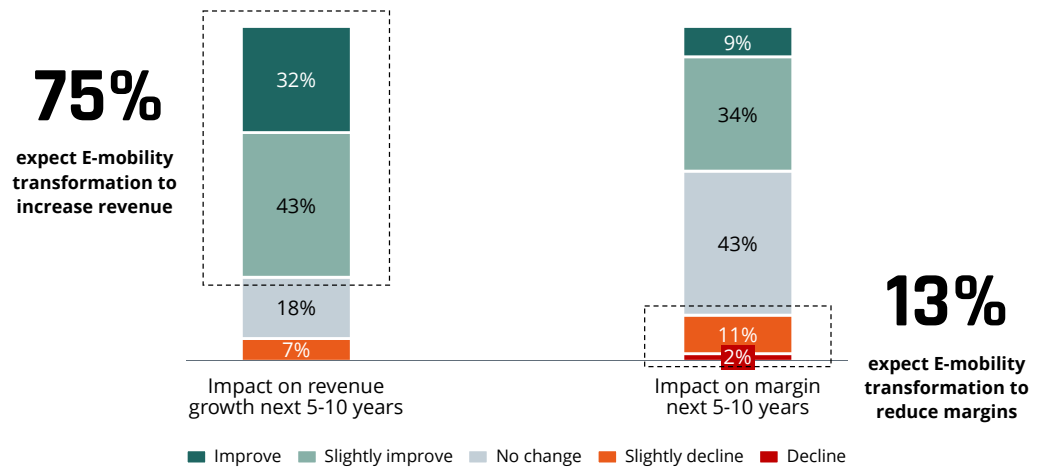


Figure 4: Potential impact of E-mobility on suppliers' revenue & profitability



Source: Berylls Strategy Advisors



HOW SUPPLIERS' LONG-TERM HOPES MEET TODAY'S REALITY

While most suppliers surveyed are optimistic about the long-term impact of E-mobility, there is still a long way to go. Consider the various challenges faced today by suppliers committed to winning a share of the E-mobility market:

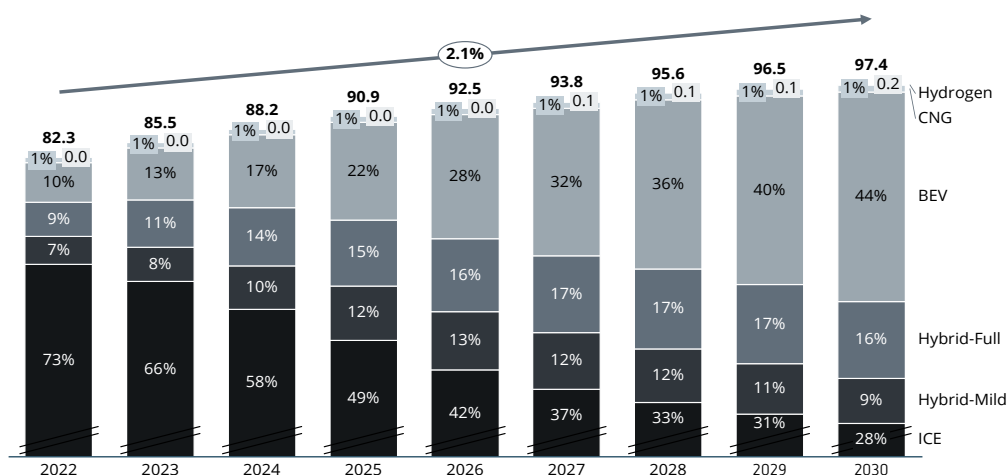
- *Continuing low volumes for platforms*
- *High R&D investments due to short innovation cycles*
- *Lack of R&D resources*
- *Strong demand for resources to enable required scale-up*
- *Intense price pressure due to strong competition and new market entrants*
- *Low margins due to low volumes, high investment and low prices*
- *Significant increase in risk exposure*

These challenges do not apply to all suppliers in the E-mobility sector. Several product groups such as cell manufacturers are performing very well. Nonetheless, our research suggests that the challenges certainly apply to the majority of suppliers aiming to transform their business toward E-mobility.

Low volumes for platforms

In the past two years, many OEMs have announced their intention to become fully electric over the next decade. To support this strategy, they have added BEV derivatives or proprietary models and platforms to their product portfolios with ambitious sales targets. Yet many of those models are still in development, and delivery time for the existing ones is stretching because the supply chain is still not sufficiently robust. Furthermore, although E-mobility adoption is growing rapidly, electric vehicles remain a niche product in many major markets.

Figure 5: Global light-vehicle production by propulsion type, 2022-2030
(millions of vehicles¹)



¹ Including passenger vehicle and light commercial vehicle
Source: IHS (04.2023), Berylls Strategy Advisors

In 2022, global BEV sales grew by more than 80% compared with the previous year. However, electric vehicles still accounted for only around 10% of global new vehicle sales. Electric vehicle sales and therefore production per platform remains rather low, given the large number of platforms under development, as the following estimates show.

In 2022, there were around 170 ICE platforms with at least 50,000 produced vehicles, representing around 86% of the global vehicle production. By contrast, only 49 BEV platforms had the same minimum production units and accounted for 9% of the global production volumes. On average, each ICE platform had around 200,000 produced units in 2022, whereas each BEV platform only had around 40,000 units in 2022. As a result, the costs of electric mobility transformation in areas such as basic R&D, new products and production lines are allocated despite low current volumes. Suppliers are lured by future BEV volumes, which are expected to be more than 40 million units by 2030, representing a remarkable market share of more than 40%.

High R&D investments

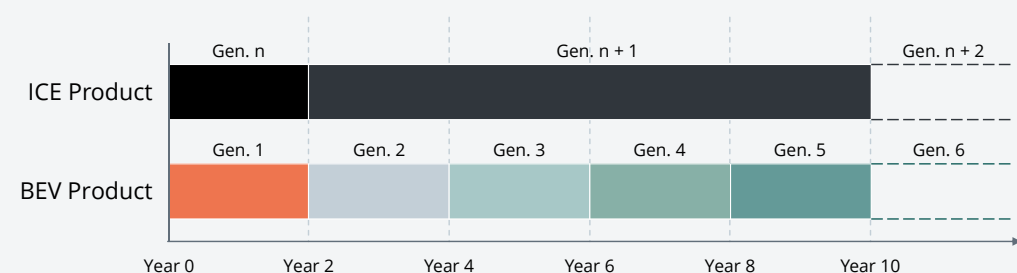
Most components in ICE-related products are fairly mature and have not been affected by major technology disruptions in recent years. Innovation cycles are relatively long and aligned with different generations of models, enabling a high level of planning.

On the other hand, electric vehicle-related technologies are still at the beginning of the maturity curve, compared with ICE technologies which were optimized in decades. The development of BEVs has only fully kicked off in the past five years, despite a long build-up, accelerated by rising BEV adoption rates and expectations, and more favorable regulation and incentives.

Both traditional and new suppliers are leveraging their capabilities in the race for technologies that will give them a competitive position in the BEV market. Innovation is therefore a must, focusing on the two major pain points for OEMs in electric vehicle production. Firstly, OEMs welcome any innovation that improves the component's performance and the vehicle's overall efficiency by extending its range or reducing the battery size, which is the main cost driver of electric vehicles. Secondly, any innovation aiming for cost reduction will either increase the BEV's competitiveness in the market or increase the model's profitability, or achieve both outcomes.

Inevitably, this technology race is leading to very short development cycles, with many suppliers bringing a new generation of their component onto the market every one to two years, compared with five to 10 years for ICE-related technologies (see Figure 6). This speed of innovation comes at a price: Many suppliers' R&D investment budgets are exploding and, as noted above, cannot be allocated to sufficient volumes, even as prices remain under intense pressure.

Figure 6: Innovation lifecycles of typical ICE-related & BEV-related products



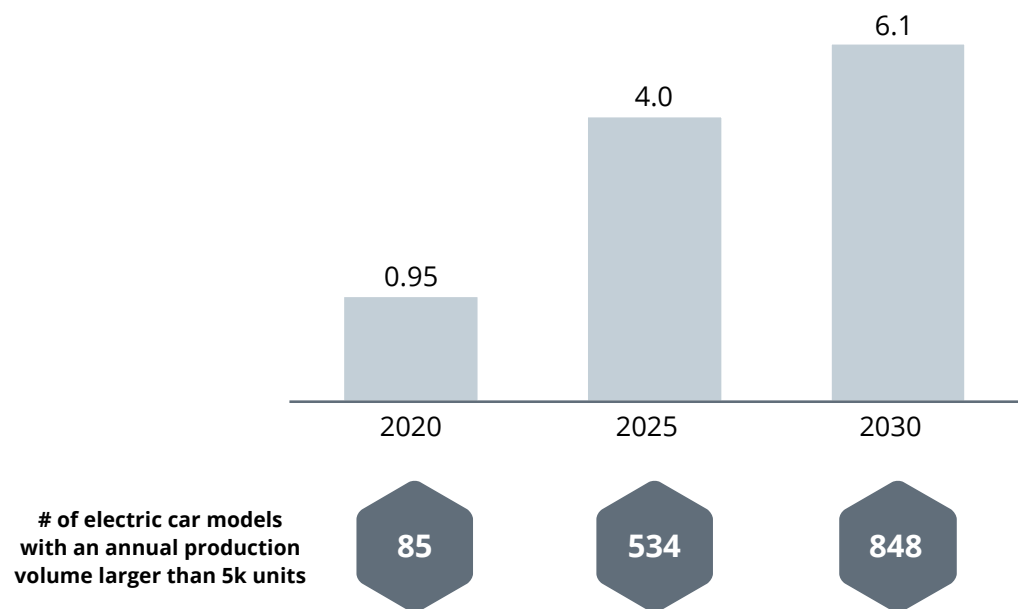
Source: Berylls Strategy Advisors

R&D resources

Suppliers' R&D costs are, of course, driven by the constant demand for hardware, software and mechatronics engineers, at a time when these are highly sought-after not only for BEV components and not only across the automotive industry. In fact, there is rising demand in other industries for skilled personnel in specialist areas such as high-voltage hardware layouts, mechatronic systems and software, meaning that qualified engineers are in short supply and expensive to recruit. For example, a job search in Europe for "electrical engineers" with no further specification currently produces more than 50,000 vacancies on a major international employment agency website.

Demand for suitably qualified engineers will continue to intensify because of the accelerating shift to electric vehicles by OEMs. In 2020, OEMs planned for around 85 different electric car models with a yearly volume of more than 5,000 units. It is now forecasted that the number will rise to 534 in 2025 and 848 in 2030, further fueling the need for R&D resources.

Figure 7: Planned production volumes for top 10 electric vehicles (millions)



Source: IHS (04.2023), Berylls Strategy Advisors

Strong demand for resources

Given forecast volumes for electric vehicles, it is clear that there will be a dramatic production ramp-up. It is not just R&D which will need more resources and investment. Various other functions will also scale up as BEV volumes increase, even allowing to some extent for the conversion of existing ICE assets.

Depending on the component, winning a new electric vehicle project may often mean a completely new production site. This will generate additional direct costs for construction, machine equipment, hiring and so on, plus indirect costs such as administration and quality control, simply to become operational. Overall, suppliers are confronted by multiple requirements for more resources to enable this ramp-up and thus their transition to E-mobility.

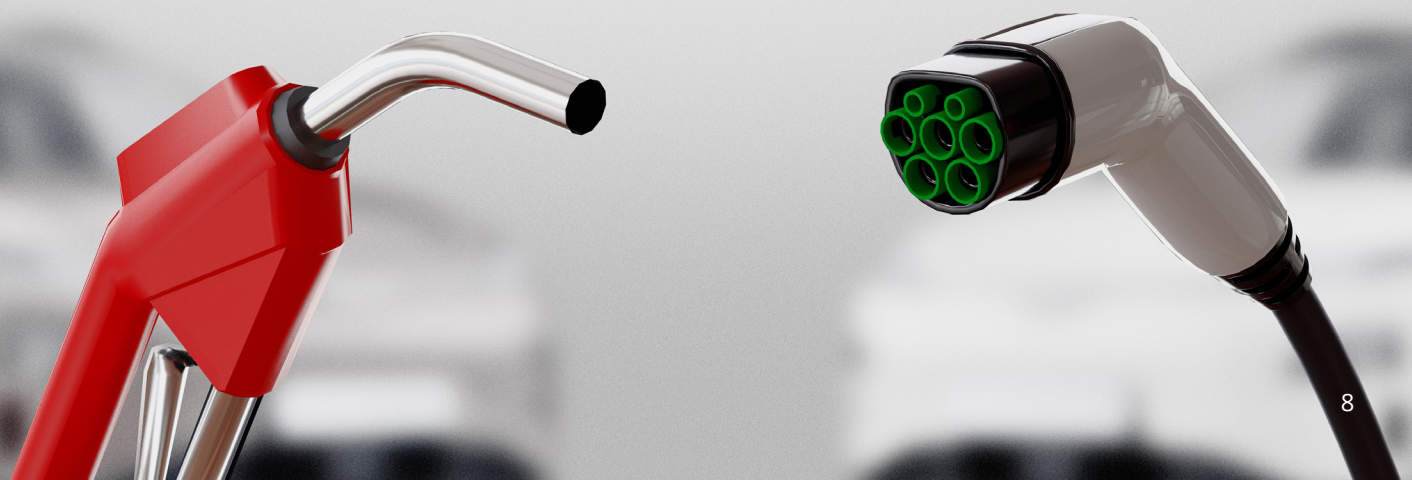
Price pressure

As BEV volumes have evolved in recent years, a tipping point has been reached. There is now little doubt in the industry that BEVs have finally made a breakthrough, with volumes set to grow steeply over the next few years. This tipping point is visible on the demand side, with the exception of some markets, and also in the supplier industry. BEV volumes have reached a critical size, making it increasingly attractive for suppliers to enter the market. In sharp contrast to the fuel-cell electric vehicle (FCEV) market, where OEMs and Tier 1 suppliers are still struggling to build a competitive supply chain for the required components, the BEV market appears to be pulling them in at an increasing rate.

This has created an interesting mix of BEV players, which includes:

- » **First movers** involved in E-mobility for several years. Their substantial investment and experience has enabled them to drive technological innovation
- » **Followers** that have recently entered BEV markets for reasons such as:
 - Realizing that their current ICE-dependent business will decline and therefore needs to be replaced
 - Believing the company has the necessary capabilities from other business segments to be successful in the BEV market
 - Seeing now as the right moment to enter the BEV market with full force, given the sector has finally established itself. Larger players in particular favor this approach
- » **OEMs** looking for new value-add to replace their “traditional” ICE business
- » **New players** from sectors such as consumer electronics entering the BEV market or expanding their automotive offer as new vertical

First movers, which have made large investments with little return for many years, are finally looking to cash in. Followers are under heavy pressure to gain market share to justify their decision to enter the BEV sector and pay off the substantial required investment. The result is that all players are seeking to capture as much as possible of the market to be well positioned for the future. Given the cost pressure on many BEV models’ bill of materials, OEMs are happy to take advantage of this trend by purchasing the latest innovation at a lower than usual price point compared with their ICE business. OEMs thereby let suppliers outbid each other and buy their respective BEV market share at the expense of profitability.



Low margins

These challenges naturally have an impact on profitability. Low production volumes, high R&D investments and price pressure due to growing competition create a hostile environment for generating average or above average margins. Many automotive suppliers are being affected, as their financial statements show. There are numerous examples of suppliers where profitability for E-mobility product segments tend to be lower than for other segments and less than the company's average profitability. In this situation, the "traditional" non-electric vehicle business is often required to heavily subsidize the E-mobility segments, causing friction within and between divisions.

Figure 8: E-mobility operating margins at three suppliers, 2022

Company	Example Supplier A	Example Supplier B	Example Supplier C
Operating margin 2022 - Total company	2.5%	20.2%	11.4%
Operating margin 2022 - Division providing E-mobility products	-37.2%	-1.7%	6.7%

Source: Berylls Strategy Advisors

Risk exposure

All these factors expose suppliers to significant strategic and operational risks at a time when most of the sector has low or negative margins due to difficult market conditions. At some point, suppliers will have to achieve at least average returns by historic industry standards to ensure the viability of their business model. However, their current need to invest heavily in rapidly-growing E-mobility segments means they may face low profitability for some time that will undermine the company's overall margin. Meanwhile, the market is consolidating for many BEV components, with many suppliers unable to make significant returns because they have only participated in the low-margin growth phase and not the higher average margin "normal" phase.

In addition, suppliers have built up significant operational risk positions. The relationship between OEMs and suppliers has changed significantly following the accelerating shift to BEVs and because of the major disruptions in recent years – notably the Covid-19 pandemic, ongoing chip shortages and the war in Ukraine. Gone are the days when a supplier would receive relatively reliable forecasts from the OEM and be able to plan its production capacity for years in advance. Nowadays, volumes constantly shift, as market success for BEV models is far less predictable in an environment where there are many new players and models, changing regulations and uncertain customer requirements.

Planning and pricing for suppliers have thus become complicated challenges, made even more difficult because there are often large warranty risks, especially in high-value BEV components and modules that do not yet have a long-term, on-the-road track record.

Overall, E-mobility is certainly increasing the risk exposure of suppliers, which in some cases can extend far beyond profit risk and threaten their survival.



5 KEY SUCCESS FACTORS FOR MASTERING THE TRANSFORMATION

As outlined above, suppliers still have a long way to go in the E-mobility segment before their positive expectations materialize. We have identified five key success factors at this crucial time in the market's development, which we believe will enable suppliers to achieve a sustainable and profitable long-term E-mobility market position.

1

STRATEGY... that is clear, focused and realistic

Define a strategy and thoroughly evaluate all its implications for risks, investments and profitability. Once defined, commit to implementing the strategy, track its effects and adjust if necessary.

We have accompanied several suppliers as they transform their product portfolio toward E-mobility. In our experience, it is crucial to think the strategy through to the potential "end game" while remaining aware of the current market environment, which is difficult in many respects. Being clear about the company's future position in the E-mobility supplier landscape is an essential first step. Secondly, it is essential to consider all possible scenarios for how the market will evolve and how far the company's capabilities match these scenarios, especially from a financial perspective. Only then will the company be well prepared with its own strategic positioning.

2

GROWTH & SYNERGIES... by organic and inorganic growth or partnerships

As we have noted, low volumes for E-mobility platforms are currently a major challenge. In the first place, the strived scale can be generated through organic growth. At the same time, inorganic growth can be an additional option to deliver the desired volumes and critical size and push the E-mobility business case. There are already some signs of market consolidation, both in terms of upcoming acquisitions and partnerships being developed. We expect this is just the beginning of further consolidation.

Whichever growth option is pursued, companies should be aware that growth is not an end in itself. It should be focused and allow the supplier to leverage its newly gained scale. For example, two highly unprofitable units will not suddenly become profitable by being merged. Winning many E-mobility projects with small volumes and little overlap and synergy potential is liable to increase a supplier's difficulties and weaken the overall business case.

3

CAPABILITY TO SCALE... for efficient and frictionless ramp-up

It is critical to ramp up the business quickly and efficiently in line with E-mobility sales growth across all functions and sites, from R&D to production. We see many suppliers struggling to deliver projects from an R&D perspective or unable to deliver sufficient components of the required quality. Reasons can be found in areas such as innovation cycles, newly built plants and varying volumes. Ultimately, they are all costly and put the E-mobility business case under further pressure.

It is thus critical to achieve excellence in all functions and a clear plan on how to leverage their increased scale in relation to new E-mobility projects and growing volumes. To maintain the company's competitiveness, it has to leverage its automotive know-how and experience in the automotive sector to ensure that its E-mobility products comply with all current industry standards in terms of performance, quality and customer delivery, while costs are progressively reduced.

4

OPERATIONAL EXCELLENCE... to reduce cost and secure profitability

Focus on strict cost-efficiency across all functions, to remain competitive and enable further investments, while securing profitability.

Operating at full efficiency should be an objective in any company, but even more so during the current E-mobility transformation. Excellence counts in all areas, from maintaining a stable supply chain to having the latest production technology, while dealing with time pressure and product designs that are often immature. We strongly recommend that suppliers ensure operational stability in operations and then immediately work on incremental improvements toward achieving excellence.

5

RESOURCE MANAGEMENT... to enable a sustainable growth

Define and manage the required resources before they are needed to recruit the right talent, provide sufficient cash and develop new capabilities on time to be ready for the market and achieve viable, manageable long-term growth.

Cash is a major concern when planning resource needs for an E-mobility transformation that will win projects and in turn require new plants and machinery. However, suppliers also need to have the right people in sufficient numbers. In particular, engineers for mechatronics, software or high-voltage components are scarce, but unequivocally required in order to win E-mobility business and deliver returns. In addition, it is crucial to have a sufficient number of skilled production workers, especially given that plants are often newly built, lack fully established processes and standards and struggle to manufacture products that are not always fully mature.

A clear overview of resource needs is more than the base for efficient operational planning. It is also fundamental for determining whether a company will grow its E-mobility business.

SUMMARY

Overall, the success of BEVs is now self-evident, with the sector set to conquer one market after another. In the long term, we agree with those surveyed that the outlook for suppliers active in the E-mobility market is positive. However, as we have noted, the road ahead is undoubtedly rocky, with many significant challenges along the way for most product groups.

It is therefore essential for suppliers to be well prepared strategically and operationally to achieve a successful E-mobility transformation – perhaps to an even greater extent than many of the surveyed suppliers say they have already prepared themselves. Only then will their optimistic outlook materialize in sustainable, long-term profitability.



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YOUR CONTACT PERSONS



Dr. Jürgen Simon
Associate Partner
juergen.simon@berylls.com



Dr. Alexander Timmer
Partner
alexander.timmer@berylls.com



Dr. Jan Dannenberg
Executive Partner
jan.dannenberg@berylls.com



Stefan Schneeberger
Project Manager
stefan.schneeberger@berylls.com



Henri Parisy
Senior Consultant
henri.parisy@berylls.com



berylls

DEM BAYERISCHEN HEERE

Berylls Strategy Advisors GmbH

Maximilianstraße 34 | 80539 München | T +49 89 710 410 40-0
info@berylls.com | www.berylls.com

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