

“WE NEED TO RETHINK THE CAR”

An interview with Professor Matthias Busse,
Chairman of Forum ElektroMobilität e.V.

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DIALOG: Professor Busse, electromobility is tied to a complex process of change. At which critical points in the value chains of the automotive industry will we see the greatest change in future?

MB: Looking ahead to the medium- to long-term from today's cars, I think we can expect far more than mere powertrain changes alone. We need to rethink the car from scratch, particularly given the further caesuras in mobility, such as driverless vehicles and the integration of networked vehicles with the infrastructure waiting in the wings. I'm convinced that electromobility can only elicit the desired success and improvements sought if these subjects are considered together. So simply removing the combustion engine and replacing it with an electric motor and battery is not enough. The car has to be rethought within the context of its environment.

DIALOG: What will that mean in concrete terms for the vehicle structure? Which components will become redundant and which will continue to play a role in an electric vehicle?

MB: From a technical perspective, certain components of conventional vehicles will undeniably no longer exist in their present form in time to come. This applies, for example, to the engine itself, the gearbox, the entire fuel supply system and exhaust aftertreatment – provided, of course, that the all-electric vehicle actually arrives. We assume that numerous hybrids will hit the market a decade from now. So we have, in a sense, combined two cars in one; combining the complete powertrain of a combustion engine with an electric powertrain – basically the most expensive, technologically sophisticated and heaviest car you can imagine. Even so, the demand will still come from the German, or European market, in particular, given the very high technological automotive standard here and the fact that no-one will compromise on range or similar right from the outset.

Conversely, if you consider the all-electric car, vehicles will become far simpler. An electric powertrain has considerably fewer components. What we have developed over the last 120 years with the combustion engine is nothing short of a tech-

nical miracle, and it is only because we produce combustion engines in such high numbers and in such an intensely competitive environment that we can offer them at all at prices the market can bear. Over time, electric vehicles will be cheaper option because of the far simpler structural design. If we had taken a different path 120 years ago by choosing to optimize the electric powertrain and were only starting to develop the combustion engine now on a small scale, it would be out of range for all but the rich. Since so much of what a vehicle now contains in terms of highly complex transmission technology or exhaust aftertreatment will disappear, supplier value chains will also doubtless change.

DIALOG: The disappearance of combustion engines, gearboxes and exhaust technology places the very existence of many suppliers into question. Can they hope to survive?

MB: There are certainly a number of companies that, with their technological portfolio, can restructure without necessarily having to reinvent themselves from scratch. Take the casting industry for example – engine blocks, cylinder heads,

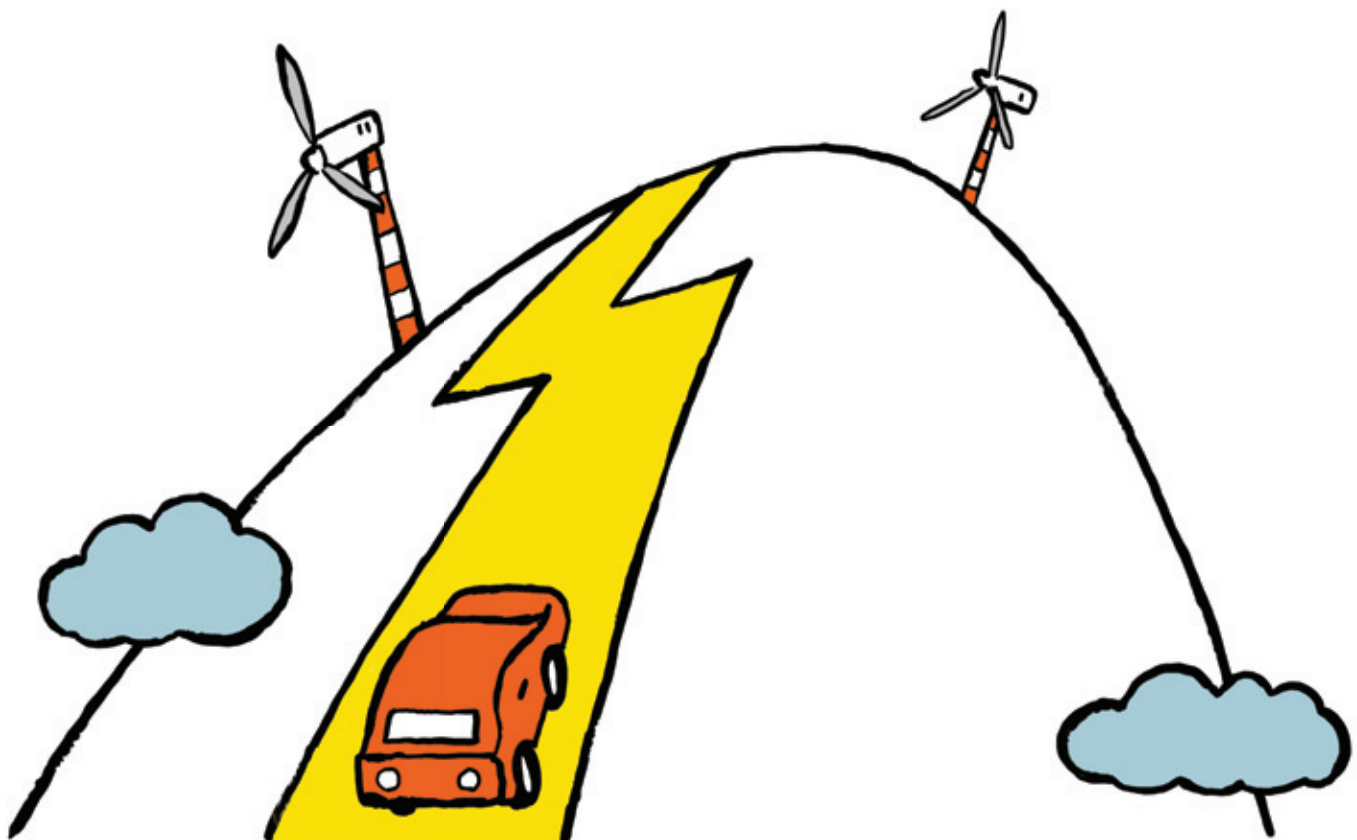
wheel rims – all of which cast components. With the exception of the wheel rim, all these parts will doubtlessly no longer be needed in their current volumes. A foundry, and the entire industry, will have to adapt accordingly and devise new offerings, which may also include alternative products. For example, thanks to a special process developed by Fraunhofer IFAM, coils used in electric motors can be cast and no longer need to be wound. Transforming the wound coil into a cast coil with new technical attributes – with this type of approach, a supplier can once again play a part in producing electric motors.

DIALOG: *What actually needs to happen in the coming years for Germany to establish itself as the leading electric mobility supplier in a globally competitive environment?*

MB: In the car industry it will all boil down to exploiting wide-ranging new technologies and mastering growing complexity in several areas of activity. Software and digital issues, for example, will become increasingly crucial. Vehicles already contain innumerable control devices, electronics and software. This trend is set to continue. Which is why links to the software industry and electronics manufacturers should be strengthened. Moreover, industries that previously went it alone will have to join forces far more. The key, however, is that we apply everything that is being discussed in other contexts under the

heading of energy transition to the car. We shouldn't separate these discussions – quite the opposite. The automotive industry and power suppliers must collaborate much more closely and coordinate their objectives. Electromobility will only make sense if we can one day obtain driving power entirely from renewable sources, which is definitely possible. The various industries all stand on their own when it comes to these topics – i.e. digital vehicle internetworking and connecting vehicles to the charging infrastructure – and operate independently from each other. Politicians also have to respond here, by promoting such networking and supporting efforts to rethink the entire car infrastructure. →

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About Forum ElektroMobilität e.V.

From a holistic systems perspective, Forum ElektroMobilität e.V. bundles relevant experts from industry, SMEs, research and politics together in the subject area of electromobility. The association brings together players at the operational level in a cross-industry dialog, placing special emphasis on SMEs. The services provided by the association, which is member-funded, include networking & contacts, information & knowledge management, marketing & communications, as well as project initiation & funding management. The influential network spawns new partnerships and innovation that pave the way to form new business models.

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DIALOG: *What examples of cross-sectoral cooperation can you envisage?*

MB: Let's take the photovoltaic industry as an example. It's a fascinating idea for all private electric vehicle owners to generate electricity on their own roof, store the power at home and use that home-produced power in the evening to recharge their electric car. The key question is, "Where do we get the electricity?" And the answer has to be, "From renewable energy." As an industrialised nation, we in Germany must and can do this.

In fact, we don't even need that much additional electricity if we wish to power all our cars that way. Experts quote just 8-10 per cent of additional electricity compared to now. If we managed our power grid intelligently, we could achieve this using renewables, i.e. wind and solar power. Nevertheless, energy storage solutions must also be found. This brings us back to the industries of interest for the car, namely in connection with the electric storage topic, i.e. the battery. Not just in the car but also for storing electricity at home or in the local municipality. It makes little difference whether the storage is integrated at home or in the car.

DIALOG: *What technological innovations can we expect in the near future with electromobility?*

MB: One fascinating question is whether electricity actually has to pass through a cable to reach the car. To which I would argue: No. Why shouldn't we work on feeding electricity into a car inductively while underway? We are familiar with this principle from the electric toothbrush. One coil can be integrated into a parking space and the receiver coil in the car. High-frequency alternating voltage can be

used to feed the car with electricity remotely. This is no problem for parked cars as the technology is basically in place. However, it can also be made to work during the journey, namely through inductive transmission. We call this process *dynamic inductive charging*. What was needed is a coil structure laid into the road and a corresponding receiver coil in the vehicle. Just imagine if we equipped all our highways with such a coil system – we would then have overcome the issue of range in a single swoop. We would have a technology where we could assume technological leadership. However, politicians need to take the right decisions to implement it, since it is just as fundamental a question as the switch from diesel to electric locomotives and the construction of overhead power lines for the rail network.

DIALOG: *What will further spur the transition to e-mobility – in Germany and overseas?*

MB: There are numerous ideas and approaches that can inspire German companies to gain a unique competitive advantage against global competition. It may all center on electromobility - but many other adjacent areas also need to be considered. If we fail to focus on them, we may end up overtaken by other countries like China or the USA. The fact that our market is filled with the best and most exciting cars around is unfortuna-

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tely a downside, since it leaves customers less than keen on buying an electric car. The situation is totally different elsewhere in the world, given the huge need for mobility.