



Paths to Low-carbon Mobility

Thoughts on the upcoming automotive transformation



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From an automotive industry perspective, it is safe to say that the year 2017 has been an interesting one.

With discussions on possible bans of the internal combustion engine in several European cities and countries, it is more than obvious that things are changing fast in one of the world's most important industry branches – and that this industry needs to prepare for the mobility of the future. At MAHLE, we have a clear vision of the path to clean mobility and, equally, of the regulatory framework that can make the upcoming transition a success.

MAHLE prepares for the future of mobility via a dual strategy

The ambitious climate targets set in Paris in 2015 call for drastic emission reductions in the transport sector. At MAHLE, we are determined to contribute by pursuing a “dual strategy”. On the one hand, we are convinced that the internal combustion engine (ICE) has a clean future. With technology innovations increasing efficiency even further and the use of alternative fuels, there is still plenty of reduction potential to be exploited, eventually leading to climate neutrality.

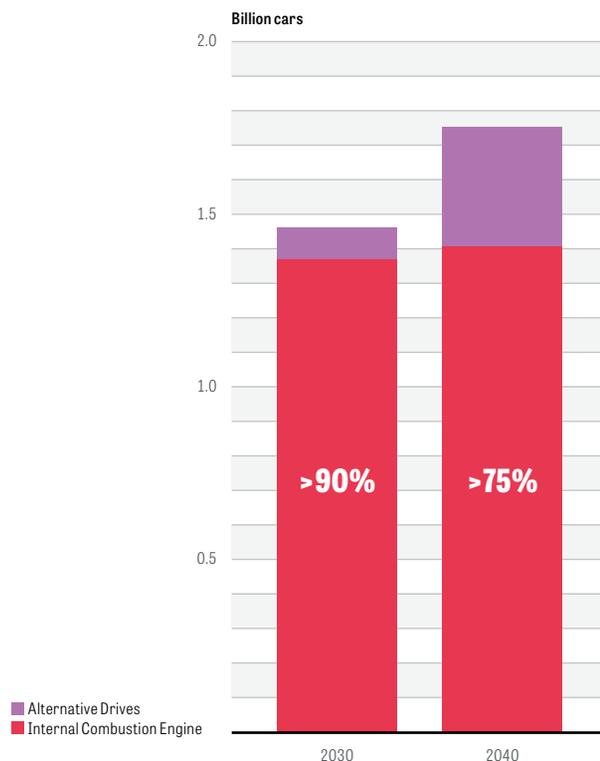


Figure 1: Expected future powertrain mix of existing vehicle fleet

On the other hand, MAHLE is also fostering e-mobility, by offering products and solutions for all forms of hybridization, full battery electric vehicles (BEV), and alternative propulsion concepts, including fuel cell technology.

We strongly believe that both technology paths need to be pursued simultaneously if we are to reach international climate objectives. Today, the ICE-based powertrain is dominant in the global car fleet. Tomorrow, despite a significant uptake of electrification, this will still be the case – at least in 2030, and most certainly looking at the then-existing vehicle fleet on the roads. Therefore, it is crucial that we continue to optimize the ICE and clear the way for alternative fuels, such as CNG and synthetic fuels.

With our MEET concept car, MAHLE shows one key path to low-carbon mobility

Clearly, electric mobility is an important part of the future powertrain mix. One of the main challenges lies in the trade-off between long-range extension and cheap batteries. Range comes with larger batteries, but this is

associated with higher costs and, crucially, increased life-cycle emissions due to high emissions linked to cell production.

To address these conflicting objectives, MAHLE has developed an urban concept car that presents one possible way to low-carbon mobility: A vehicle that is dedicated to the modern urban mobility of larger cities where consumers need individual transport opportunities without the burden of size and weight of vehicles for long distance travel. At MAHLE, we believe that this new vehicle class will emerge with the rise of “zero emission zones”. With its 48V drive unit and small battery, MEET (MAHLE Efficient Electric Transport) excels in affordability, energy efficiency, and in cutting carbon emissions. What is more, MAHLE’s expertise in the field of thermal management contributes to an extension of cruising range – all without increasing battery size and hence overall carbon footprint. MEET demonstrates that electric mobility can reduce CO₂ emissions. But let us not pretend that this is the case for any electric car because this depends on the electricity mix and, crucially, battery size. If we want electrification to succeed, we need to have an open debate on its advantages and disadvantages from the start. Otherwise, we risk disappointment and a backlash.

For European industry, the transition will be challenging – but there is no alternative to proactively driving it

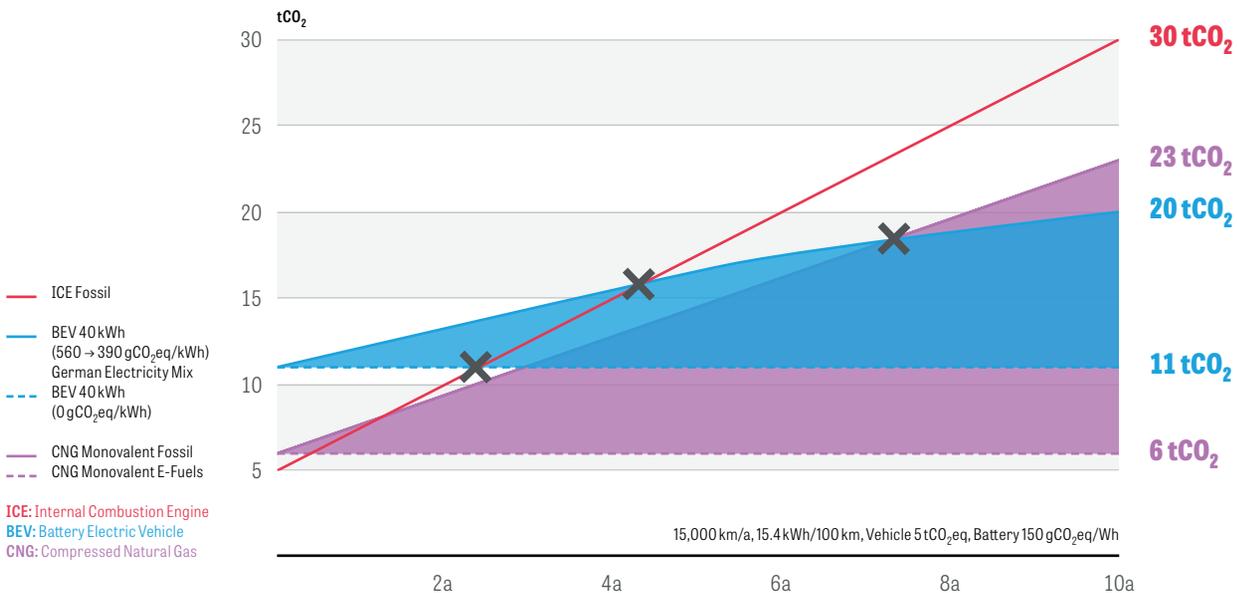
The last century has witnessed the formation of a close-knit cluster of European manufacturers, suppliers, universities, and research institutions, all clustered around the combustion engine. This includes the mechanical engineering industry, which produces the machinery necessary for ICE production. According to recent research by the Ifo Institute for Economic Research, 15 percent of Germany’s overall industry production (or a production value of €212.8 billion) is directly or indirectly linked to the future of the combustion engine. Paradoxically, it is the strong position in ICE technology that offers the financial basis for the high upfront investments into electrification.

For this cluster, the transition will no doubt be a challenge – technologically, financially, socially and, not least, mentally. But instead of burying our heads in the sand, we must take a proactive stance in our companies – and ask political decision-makers for realism on the efforts and time required so that the transformation does not become a disruption.

EU regulation has been a success – but the current regulatory approach has reached its limits

As a supplier of innovative technologies, MAHLE appreciates the innovation stimulus that can come from legislation. In the past, however, EU legislation focused on test cycle performance, resulting in cars being clean in the test but polluting in the real world. When it comes to pollutant emissions, the lesson has been learned, and the Real Driving Emissions (RDE) test procedure has been introduced. When it comes to CO₂, however, we risk repeating past mistakes.

Figure 2:
The CO₂ footprint of the battery and electricity production



AN AMBITIOUS EUROPEAN REGULATION SCHEME IS NECESSARY IF WE ARE TO REACH THE INTERNATIONAL CLIMATE GOALS.

Example 1 HVAC: Heating, ventilation, and air conditioning are important energy consumers that are not considered in the existing regulation, although their efficiency can cut CO₂ emissions from combustion engines and extend the range of electric vehicles (EVs). If this remains the case, the discrepancy between test and real consumption values should come as no surprise. Credits for efficient systems as part of the revised CO₂ regulation could transform the market, offering a win-win for industry and the environment.

Example 2 Plug-in Hybrids: The emissions are only reflecting the real conditions if the owner uses the vehicle mostly in electric mode. A condition that is not always fulfilled in real life and should in the medium-term lead to a review and a more realistic classification of this vehicle type.

But this alone will not suffice, since the underlying problem is more fundamental. Currently, the EU CO₂ regulation is following a so-called “tank-to-wheel” approach, focusing on tailpipe emissions only. This means that emissions from phases other than the use phase are not included in the calculation of a vehicle’s emissions, which brings about two important shortcomings.

First of all, as any engineer will tell you, this approach fails to compare different technologies in a fair manner. This is because the regulation completely neglects the underlying national energy mix. Hence, EVs are credited with zero emissions even if they are charged with electricity from coal-fired power plants. To make matters worse, the approach ignores high emissions linked to cell production. And to those who claim that those emissions are already covered under the EU emissions trading scheme, please double check where in the world cells are produced.

Secondly, the current regulatory framework inhibits investments in alternative fuels. This is particularly unfortunate since synthetic fuels can actually turn the conventional powertrain into a climate-neutral technology.

Take synthetic gas for example. When produced with regenerative electricity, burning such gas is nearly CO₂-free over the life-cycle (as CO₂ that was extracted from the air during production is released again during combustion). But the regulatory logic will penalize such a car even though it performs better than an EV with respect to its life-cycle emissions (unless the electricity used for running and producing the EV is “green” – an aspect foreign to EU legislation). This blocks investments into CO₂-saving solutions by both the automotive and the fuels industry.

A smart regulatory framework can help make the transition a success.

For the reasons discussed above, the EU should use the opportunity of the upcoming revision of the CO₂ legislation to create a holistic regulation that eliminates the obvious current shortcomings. However, besides following a technology-neutral approach, there are several other ways in which politics can facilitate the industry’s transition process. For instance, one could initiate specific R&D projects, offer attractive training and qualification measures for (present and future) employees, or support the creation of new industrial clusters through test facilities for e-mobility solutions. And if we also want to make the transition a success in the labor market, a beneficial long-term strategy could put an emphasis on hybrid vehicles, thereby gradually electrifying the global car fleet and avoiding labor market disruption to the extent possible.

Conclusion: Learn from past mistakes and prepare for the future

The Paris Agreement has set off a far-reaching transformation process to which the industry needs to respond – the sooner the better. MAHLE is all set to be an active player in this transformation with our dual strategy. At the same time, industry and society need a regulatory framework that allows more than one path to climate-neutral mobility. This includes not only electrification, but also alternative fuels and efficiency improvements of engine components.

All of the above suggests that the discussions in some European countries are no example to follow. Banning the combustion engine means banning one possible path to clean mobility. Instead, a smart regulatory framework needs to promote electrification in a sensible way and, in addition, clear the path for an internal combustion engine that is climate-neutral. Whatever way you look at it and despite the expected increase in electrification, ICE technology will continue to account for the lion's share of the global powertrain mix throughout the next decades.

Clearly, an ambitious European regulation scheme is necessary if we are to reach the international climate goals. But EU regulation should push automotive suppliers like ourselves to reduce overall emissions – instead of forcing us to narrowly focus on tailpipe emissions. Otherwise, I fear Europe has learned little from recent scandals and risks making past mistakes all over again. ▀

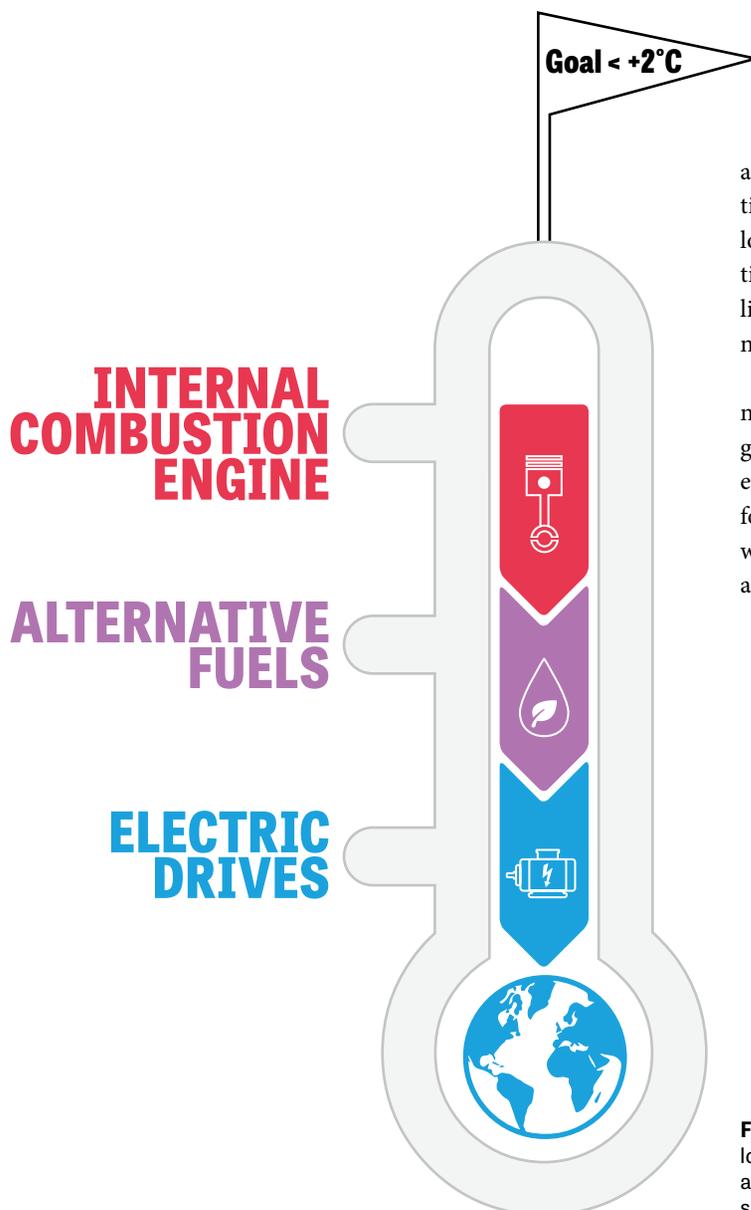


Figure 3: Paths to low-carbon mobility in a technology-neutral scenario