



EU's Euro 7 plans: Threatened phase-out of internal combustion engines would endanger entire industrial value chain

Mechanical engineering industry as a solution provider relies on openness to all types of technology

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PREAMBLE

The VDMA represents over 3300 mechanical engineering companies in Germany and Europe. The industry stands for innovation, export orientation, medium-sized businesses and employs around four million people in Europe. With regard to the automotive industry, the **mechanical engineering sector is equally a provider of production technology, a supplier of components and parts, and a manufacturer and user of combustion engines**, for example for power generation, for ships, and for mobile machinery in the agriculture and construction industry.

With 90,000 companies and almost four million employees across Europe, mechanical engineering is one of the largest industries in the EU economy. With an estimated 36 per cent share of the world market, Europe is the largest producer and exporter of machinery and equipment. Framework conditions for innovation and new solutions create and secure employment here; extraneous regulations and technologically unsupported targets threaten these.

Tighter exhaust emission legislation for passenger cars and commercial vehicles as discussed in the context of the current Euro 7 debate would not only affect the automotive industry, including the supplier industry, but also the entire value chain (suppliers of production equipment). In addition, other users of combustion engines (such as mobile machinery for construction and agriculture) would also be affected, so that overall a massive weakening of the entire mechanical engineering industry is probable.

Prosperity in Europe depends significantly on a competitive industry that can constantly develop its products and offer them successfully on the global market.

Legal constraints on technological development can be helpful in this respect, provided it does not overburden entire industries or unilaterally ban technologies - either directly or (as in this case) indirectly. Targets must therefore be open to technology and set in such a way that they can also be regarded as beneficial in relation to the economic and social costs. With this in mind we would like to discuss an ambitious, balanced Euro 7 regulation with political decision-makers.

BACKGROUND

The EU Commission is working on new exhaust emission legislation for passenger cars and commercial vehicles (Euro 7). Input for the Commission's ongoing impact assessment in this context comes from a panel of experts (CLOVE) and is regularly discussed in the *Advisory Group for Vehicle Emission Standards* (AGVES).

At the AGVES meeting in autumn 2020, two scenarios were presented that would result in vehicles becoming nearly emission-free under virtually all circumstances and operating conditions. This discussion proposal is justified with the Commission's *Zero Pollution Strategy*. Accordingly, emissions legislation is to be significantly tightened in four areas:

1. The current limit values are tightened by a factor of 3-10.
2. Specific measurement conditions for boundary areas are effectively eliminated, so vehicles must not only be clean under normal operating conditions, but also achieve near-zero emission levels under the most adverse driving conditions.
3. The mileage for which a manufacturer must guarantee compliance with these requirements will also be expanded dramatically; the durability requirements will thus be significantly tightened, and natural aging of the components for exhaust gas purification must therefore be overcompensated for when new.
4. For measurements on the road (using PEMS¹), the tolerance is set to zero, which goes against any technical feasibility.

All these tightening measures taken together mean that the current CLOVE scenarios would not be achievable in this form; **the future of internal combustion engines² in mobility and far beyond is de facto threatened in this way.**

Greenhouse gas emissions are not yet covered by Euro 6, but this issue must nevertheless be considered in relation to the Euro 7 targets: The physical trade-off between consumption (and thus CO₂ emissions) and further reductions in nitrogen oxide emissions in particular must be taken into account in a cost/benefit analysis, and a legal framework aimed at sustainability must balance the triad of ecological, economic and social concerns.

KEY DEMANDS

The VDMA welcomes the efforts of the EU Commission to further improve air quality in Europe. Our industry is rising to the challenge of further lowering limit values and adapting measurement methods - in the VDMA's view, both technological and economic feasibility must be taken into account:

- The proposals for Euro 7 regulation discussed so far jeopardize value chains far beyond the automotive industry by leading to a de facto ban on cars and trucks powered solely by internal combustion engines. **Europe cannot afford that.**
- While there is **no benefit to local air quality** as compliance with the current requirements for new vehicles already ensures the EU's clean air targets, the proposals jeopardize **more than**

¹ PEMS: Portable Emission Measurement System

² This applies equally to gasoline and diesel engines

a million and half industrial jobs in Europe. Legal framework conditions must be designed in such a way that industrial jobs are not carelessly put at risk.

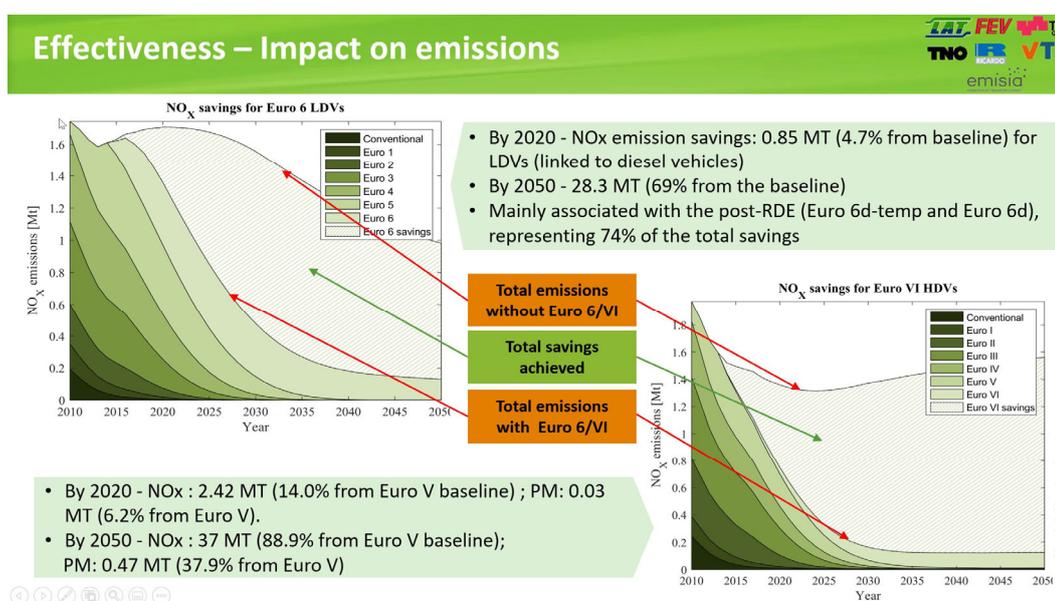
- The necessary industrial transformation must reconcile air pollution control and climate protection. To achieve this, European industry needs a reliable framework that is open to technology - then it can **become a global driver for climate protection.**

I. Euro 7 must be feasible and beneficial

The scenarios of future emission limits for passenger cars and commercial vehicles (Euro 7) discussed to date define requirements for the internal combustion engine with regard to emissions which, although theoretically technically feasible, completely call into question the marketability of the products due to the necessary technical complexity and the associated extreme costs. **This would also mean that engines powered by hydrogen or hydrogen-based derivatives (eFuels) would not be marketable** - but with eFuels, internal combustion engine drives can also be operated in a CO₂-neutral manner and thus make a significant contribution to climate protection, especially in existing fleets. It is also important to bear in mind that the situation on the world market will continue to differ strikingly from that in Europe (and comparable markets) for many years or even decades to come: Ignoring this will not only cause massive damage to the European automotive industry.

Additional benefit questionable, economic damage immense

Compared to the already very low Euro 6d or Euro VI-E limits, an additional benefit of an even stricter Euro 7 standard is of less benefit to the environment. According to the German Federal Environment Agency, the real emissions of a Euro 6 diesel car are 40 mg/km - i. e. 50% below the valid NO_x limit value. **The Euro 6d emissions of modern engines are therefore already so low that air quality targets are achieved with the existing Euro 6 / VI regulation.**



Source: CLOVE Presentation “First findings from the Euro 6/VI evaluation study”, AGVES meeting, 9 July 2020³

³ The upper curve represents the case without the introduction of Euro 6/VI, this means that only Euro 5/V cars exist (and evidently no electrified nor electric vehicles other than low numbers of hybrid vehicles). The fact that it picks at 2021 and then starts declining is due to the fleet turnover and the mileage/fleet assumptions.

Tighter regulation of the marginal areas of Real Driving Emissions (RDE) should be considered if necessary, but in combination with a drastic reduction of the limit values overall, this would lead to the above-mentioned de facto technology bans in extreme cases. The reduction of other emissions, with regard to which there is no longer an immission problem in Europe, seems equally unnecessary and not expedient. On the other hand, the regulation of other, hitherto unregulated emissions (such as ammonia) would be reasonable considering the technical and economic framework conditions, if a positive impact on air quality is given.

Euro 7 threatens entire supply chain

The Euro 7 legislation currently under discussion would lead to massive distortions within the European engine and automotive industry, the proportionality of which must be questioned, particularly in comparison with the expected benefits. Euro 7 would not only be the next step in air pollution control, it would also be a break in the system with lasting negative effects on the entire European value chain. **This is all the more true in view of the ambitious timetable with an introduction date as early as 2025. Vehicles and engine concepts that are to be launched on the market by then are already under development today** - this applies in particular to commercial vehicles.

This prospective dismantling of a high-tech industry would have a huge impact on both the entire supplier industry and the research landscape, ultimately **destroying industrial value creation in sectors in which the combustion engine powered by eFuels must continue to exist as a CO₂-neutral energy converter for a long time to come**, such as in mobile machinery and ships. In the worst-case scenario, more than a million and half jobs in the affected industries, not only in the automotive sector, will be at risk in the next few years in Europe⁴.

II. Do not omit climate protection

Greenhouse gas emissions are explicitly not covered by Euro 6. When regulating the emissions with Euro 7, however, for reasons of climate protection, it is imperative to consider the impact on the total amount of greenhouse gases. This retroactive effect can either directly affect the resulting CO₂ or indirectly on climate-relevant substances. The emission of N₂O (nitrous oxide) can be taken as an example. Nitrous oxide is not toxic but has a high greenhouse gas potential⁵. Therefore, it makes sense to regulate this component with its GHG⁶ contribution, despite transport only being a minor contributor to global nitrous oxide emissions. Very stringent NO_x emission limits require very high reduction rates of nitrogen oxides in exhaust gas aftertreatment, which would not make a relevant contribution to improving air quality, but emissions of climate-

⁴ Source: <https://www.plattform-zukunft-mobilitaet.de/wp-content/uploads/2020/03/NPM-AG-4-1-Zwischenbericht-zur-strategischen-Personalplanung-und-Entwicklung-im-Mobilit%C3%A4tssektor.pdf>

The NPM's interim report on strategic workforce planning and development in the mobility sector from January 2020 states in the so-called "Electromobility Scenario Plus" a loss of 410,000 jobs in Germany alone in 2030 with 10 million BEV vehicles. Assuming a de facto ban on internal combustion engine-powered vehicles from 2025, the number of BEVs would have to be higher and there would probably be significantly greater dislocations in the entire automotive value chain. The assumption of half a million jobs at risk can therefore be regarded as a conservative estimate, but no more concrete data are available. No corresponding studies are available for the EU, but a conservative estimate would have to assume well over 1.5 million jobs at risk in the affected sectors as a whole.

⁵ Nitrous oxide (N₂O) is one of the most harmful climate gases. The gas is only present in the atmosphere in trace amounts, but it is almost 300 times more effective than CO₂. If Euro 7 is the right place for a GHG regulation can be questioned.

⁶ Abbr.: Greenhouse gas(es)

relevant nitrous oxide, for example, could increase. As already mentioned elsewhere, meaningful regulation requires a profound consideration of all interdependencies.

For another reason, the Euro 7 proposals would run counter to climate protection: Without any doubt, electric vehicles will make an important contribution to reducing GHG emissions in transport in the future. However, taking into account the current European energy mix, they cannot be considered emission-free. It is therefore too short-sighted to want to completely dispense with new diesel vehicles as early as the second half of the 2020s. This is all the more true since even alternative drive systems already announced in the commercial vehicle segment (i.e., fuel cell vehicles in particular) will not yet have a relevant market share at that time. In this respect, commercial vehicles will still be dependent on diesel technology at the end of the 2020s, just like their industrial counterparts in construction and agriculture - and can nevertheless be used in a climate-neutral manner by means of synthetic fuels.

In the context of the discussed revision, it is namely necessary to consider another aspect, if the legislator wants to get a comprehensive picture: The technology of the combustion engine is independent of fossil fuels! **A substitution of mineral oil-based fuels is feasible for combustion engine driven applications - by means of advanced biogenic fuels and especially by means of hydrogen based CO₂-neutral fuels, produced with regenerative electricity.** When these so-called eFuels are burned only the amount of carbon dioxide that was previously chemically bound from the atmosphere during production is released. Due to the synthetic production of such fuels and the resulting material purity compared to their fossil counterparts, the combustion of eFuels is very clean and can be brought to a level close to zero with exhaust gas aftertreatment technology already available. In this context, we support the German government's hydrogen strategy as an important building block for hydrogen-based mobility - be it through fuel cells, eFuels, or even by means of direct combustion of hydrogen in the engine. Such technologies are an important complement to electromobility and can generate important opportunities on the world market for European industry as the current market leader.

III. Applications with internal combustion engine will remain

Regarding defossilisation of transport it is also important to consider neighbouring sectors of the economy. Supported by legal framework conditions in conjunction with state subsidies, battery-electric and hybridized vehicles in particular will prevail in individual transportation in the future. This will bring advantages in terms of lower local noise emissions and (with a growing CO₂-neutral electricity mix) also in terms of global GHG emissions. And mechanical and plant engineering is also the decisive solution provider here - whether as a manufacturer of production technology for batteries, electric motors, fuel cells, etc., or as a component supplier or system provider of such technologies. However, for many applications driven by internal combustion engines, such as heavy-duty transport or agricultural and construction machinery, direct electrification will only be feasible to a very limited extent in the foreseeable future due to technical limitations. And fuel cell technology, despite corresponding development, will not be able to fully cover all of today's combustion engine application areas either.

CONCLUSION

It is therefore important to weigh up carefully what is to be achieved with Euro7 regulation and how these objectives can be implemented without the collateral damage to European industry and particularly to mechanical and plant engineering that has been highlighted.

- We support transparent and sensible **objectives that serve the EU air quality targets**; these objectives must be technically and financially feasible (also for the customer).
- We want to weigh up and respond to the conflicting technological goals of air pollution control and climate neutrality in an **open dialogue on technology**.
- We want to **enable a pathway for eFuels deployment** where it is necessary and the most efficient climate policy solution.
- We advocate **cost/benefit trade-offs** in the context of an open-ended impact assessment.
- We advocate **technology-open regulations** that preserve opportunities also for existing technologies, taking into account industrial European value chains.
- We want to **conduct this discussion in a goal-oriented manner** and are available for corresponding discussions at all levels.

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