The Evolution and Future of Mobility: Historical Overview and Current Challenges in Transitioning to New Mobility Solutions

The Sustainable and Affordable Mobility Forum

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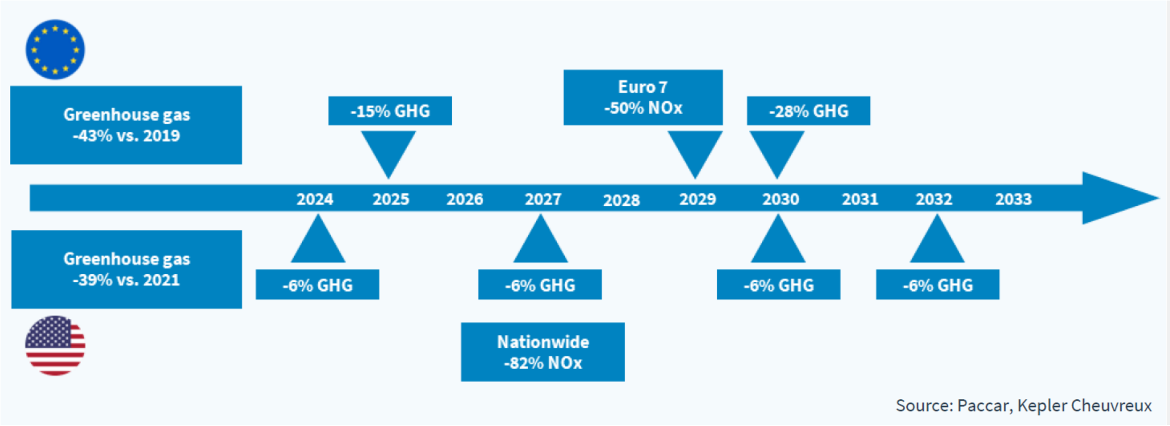
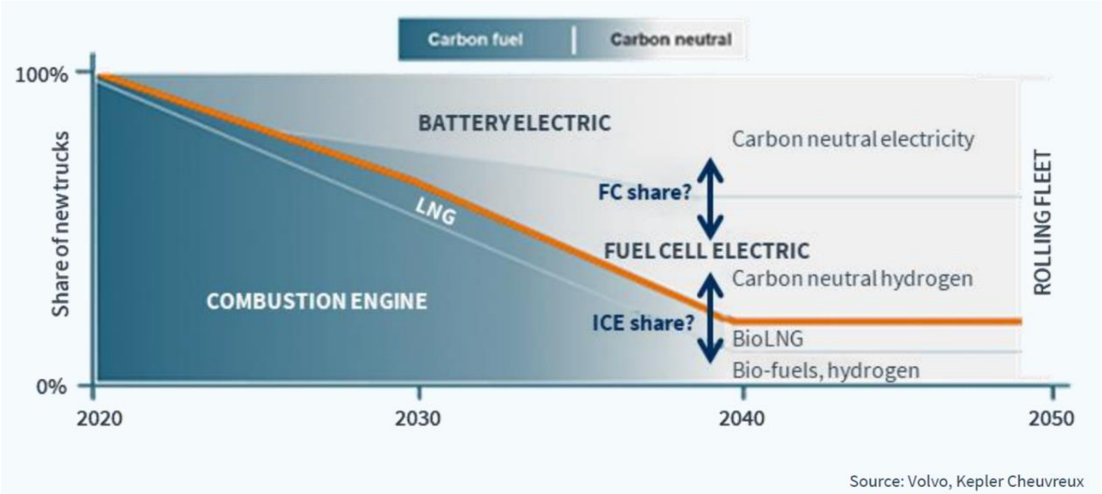
The Powertrain transition challenge remains severe.

Summary of emission regulations in Europe and the US



Expected development of rivalling types of low- and zero-emission powertrains

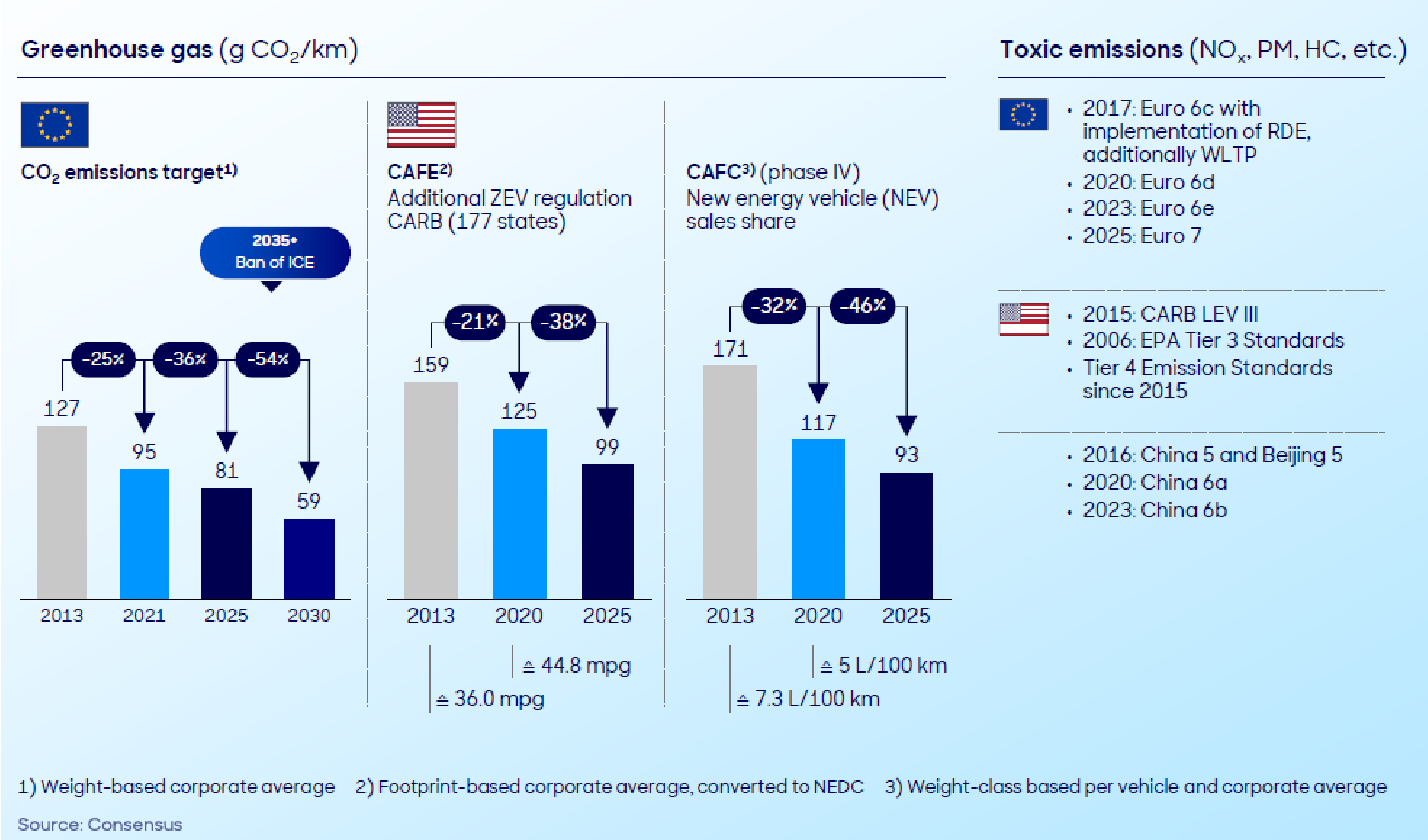


- CO_2-reduction plan is an integral part for the „Fit for 55“-regulation (passenger and commercial vehicles)
- Targets for CO_2-reduction are ambitious
- There is a strong voice for technological openness
- Customers expect the co-existence of alternative powertrains
- Customers and industry need clarity quickly
- Associations urge to advance the “re-regulation” to 2025 instead of 2026/27.

Source: Kepler Chevreux, Autos & parts, 27.09.2024

Reducing emissions across all major automotive markets is a driver for innovation for OEMs and suppliers, but what is realistic?

Evolving emission regulations for passenger cars



- The industry supports Paris climate goals
- Is the current regulation realistic?
- Where is the infrastructure expansion?
- Why are Carbon Neutral Fuels Vehicles not classified as CO_2-free?
- Why are only new registrations in the political focus?
- Is the transformation too fast?
- Did we forget the customers?
- … and the suppliers?

Source: Roland Berger & Lazard,
GLOBAL AUTOMOTIVE SUPPLIER STUDY 2023

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Truck OEMs are ready to meet tougher emission regulation. Different OEMs favour different technologies. Open-technology is indispensable!

BEV-Truck

Clean Diesel (New ICEs)

H2 Fuel Cell

Hydrogen Internal Combustion

Diesel Plug-In Hybrids

LNG and other options

Fuel Cell Electric solutions

Problems:

- Charging infrastructure?
- Green H2 available?
- Payload and range sufficient?
- Customer looks at Total Cost of Ownership (TCO)
- Margin pressure (Powertrain is 60-65% of manufacturing costs)
- Review by the EU-Commission necessary (When? How?)

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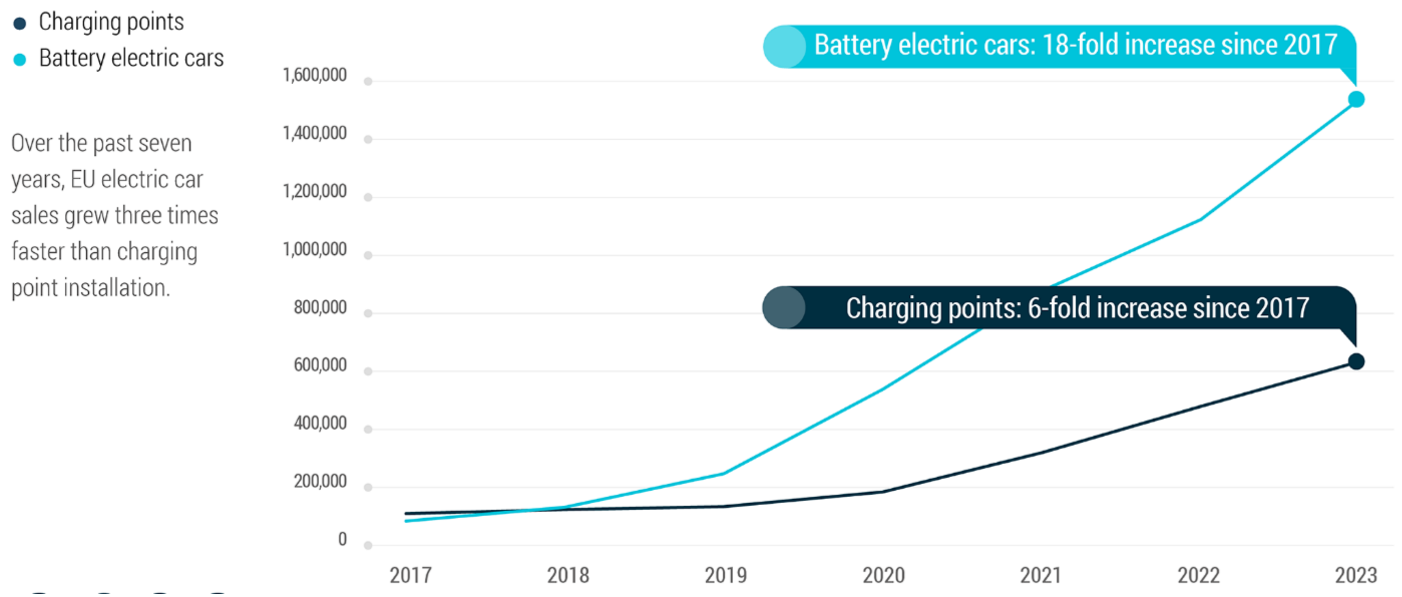
Charging infrastructure is still the “alarming gap” in the EU.

8 times more charging points per year needed by 2030 to meet CO_2-targets!

Charging Points Developments vs. Sales of Battery Electric Cars

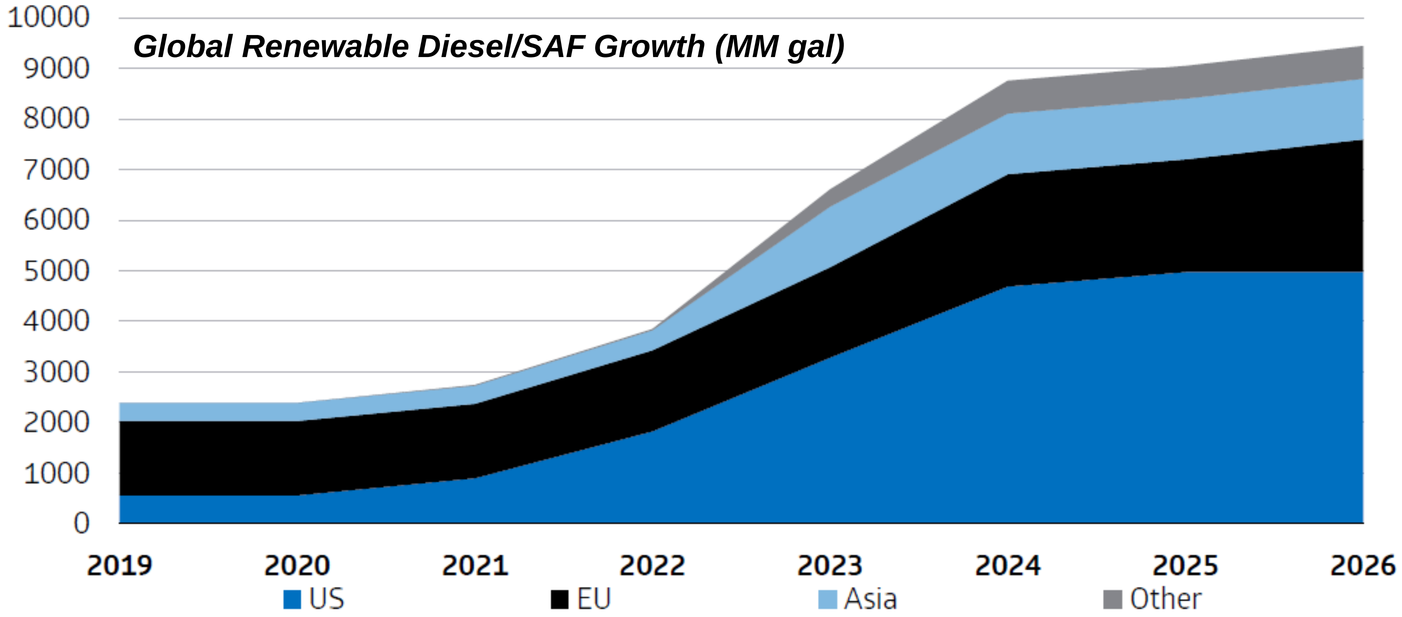


- The industry is constantly accused of not being fast enough in CO_2-reduction.
- But without widespread availability of public charging infrastructure will be no mass-market adaption of BEVs (ACEA).
- ACEA estimates that 8,8 mio charging points will be needed by 2030. (22.000 per week!)
- Currently only every 8^{th} charger is a fast charger.

Source: ACEA, April 2024

Why not focussing more on vehicles in use in addition to new registrations to faster reduce CO_2-emissions?

- We expect only 11-12 mio new car registrations in the EU, roughly 1,5 mio vans, 350.000 new commercial vehicles and 33.000 bus registrations.
- But we have 289,6 mio motor vehicles on the road, thereof 252,2 mio passenger cars, 29 mio vans in circulation, 6,2 mio medium and heavy vehicles and 685.100 buses in operation.
- HVO100 (Hydrotreated Vegetable Oil) could help to reduce CO_2 up to 90%. Biomass-based fuel is available in the US and Europe (in Germany only since April 2024!!! Why so late?)



- HVO will reduce lifecycle Greenhouse Gas Emissions compared to Diesel
- Similar rated power output, NOx-emissions, etc.
- Lower smoke emissions
- Easy to switch to
- Additional costs bearable.
- Positive customer feedback.

The auto industry badly needs relief in the political CO_2-discussions!!!!

Source: Cowen, Future of Mobility Primer, 2022

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