

# Ten years on...

Lessons learned in China over the past decade can help as the European Union pushes truck and bus electrification

►► It is 10 years now since the Chinese government started pushing for vehicle electrification, particularly the rolling stock in the country's mega-cities. And the move has been quite a success story, with 99% of the global electrified bus stock – close to 400,000 units – operating on Chinese city roads by the end of 2017.

It has taken Europe a little longer to move, but in the summer of 2019 the European Parliament established binding regulations that will force lorry manufacturers to reduce CO<sub>2</sub> emissions from new heavy commercial vehicles by an average of 15% from 2025 compared to 2019-2020, and then by 30% from 2030.

Emission-free and low-emission vehicles will fall under a super-credits system until 2024, and by the following year manufacturers must also ensure that zero-emission or low-emission vehicles account for at least 2% of all new vehicles sold.

On top of that, EU member states have been set binding targets for using emission-free commercial vehicles in public procurement.

For example, Germany must procure at least 38.5% emission-free vehicles from public orders of light commercial vehicles. The figure is 10% for heavy commercial vehicles (15% from 2026) and for buses it is 45% (65% from 2026).

Semikron, a leading supplier of power electronics equipment, has been providing products for vehicle electrification for more than 25 years. Starting with material-handling applications such as forklifts in the 1990s, Semikron has since equipped more than 1.5 million vehicles for material handling and beyond 200,000 passenger cars with power electronic products.



Semikron has shipped more than 50,000 traction inverters from the SKAI2HV product family for use in China's growing fleet of electric buses

The company has also contributed significantly to the electrification of Chinese city buses, shipping more than 50,000 traction inverters from the SKAI2HV product family. Since 2013, these inverters have accumulated more than one billion field-operating hours.

The resulting field data underlines the fundamental advantages of the solder-free assembly of power semiconductors as incorporated in SKAI2HV inverters. The lack of solder joints in the SKAI2HV power semiconductor assembly enables the product to fulfil the challenging requirements for load power cycling, which is a direct consequence of the continuous accelerations and decelerations that take place in city bus drive cycles.

Since the end of 2018, the second edition of the automotive functional safety standard ISO26262 has applied to the development

programs of commercial vehicles with a gross weight of more than 3.5 tons. The manufacturers of electrified commercial vehicles have analysed their vehicle hazards and risks for potential failures.

To mitigate those risks, the suppliers of key components such as the traction inverter are now – depending on the chosen vehicle safety concept – often requested to add certain safety requirements into their product specifications.

Semikron has prepared itself for these extended requirements and is now jointly customizing its SKAI products in accordance with customers' individual safety goals. Consequently, Semikron certifies its quality management system and software development process in accordance to IATF16949 and Automotive Spice, respectively. All process items of the Automotive Spice standard fully coincide

with the ISO26262 development process steps.

Since launch, the SKAI2HV product family has been available on different integration levels to align it with customer needs. These levels comprise variants with a gate driver interface, which offers direct control of power semiconductor switching signals, or a CAN-bus interface. The required motor control software for the latter is offered by Semikron, but might also be proprietary to the customer.

Semikron will contribute to the European vehicle decarbonisation program, and the additional challenges introduced by the new ISO26262:2018 will be covered by the SKAI products that have been proven in use in China since 2013. 🌐

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