

45th International Vienna Motor Symposium:

Replacing 30 million barrels of oil per day

Only a sufficient regenerative energy supply can guarantee CO₂-neutral mobility

The 45th International Vienna Motor Symposium, which took place in the Vienna Hofburg in late April 2024, came to the following conclusion: There is no single solution to CO₂-neutral mobility; the Industry will have to explore multiple pathways in order to achieve the goal. "In the case of vehicles, however, the quickest and most effective approach will vary according to utility group", said Bernhard Geringer, Chairman of the Austrian Society of Automotive Engineers (ÖVK), which organised the symposium. Whatever the approach, the undisputed fact is that alternatives will be needed for some 30 million oil barrels used per day worldwide for transportation.

"The automobile industry is going through what is arguably one of the most challenging phases in its more than 140-year history", said **Helmut List**, CEO of Graz-based AVL List. Innovations and technologies alike are entering the market "at higher speeds". In addition, planning business has become more difficult through fluctuations both in customer behaviour and in the general legal and market policy environment. For instance, "a multi-billion investment in a gigafactory for batteries could quickly become obsolete" if a better cell chemistry were to be invented somewhere in the world.

And as many experts emphasise, battery development is still in its infancy. For **Karl Rose**, former Chief Strategist at the Abu Dhabi National Oil Company (ADNOC), "batteries are the oil of the future. I am absolutely certain that private transport in Europe, America, and China will be electrified by the year 2050." Year by year, however, Europe is falling behind in the area of batteries when compared to the US and Asia, where much larger sums are invested in this sector.

The VW group plans to at least reduce its dependence on battery cell suppliers. Battery cells account for some 40 percent of the value of an electric vehicle. "Our objective is to manufacture 50 percent of our battery cells ourselves", explained **Michael Steiner**, Head of Research and Development at Volkswagen AG. To achieve the next technological leap, VW is intensifying its cooperation with suppliers of solid-state cells. Solid-state batteries can be charged more quickly, offer a higher range between charges, are more reliable and durable, and are safer than current lithium-ion cells. Steiner expects the overall costs for battery cells to drop by up to 40 percent by 2035.

Transition to e-mobility slower than expected

Even in Europe, the overall transition to a battery-electric mobility is taking place at a slower pace than many manufacturers had hoped. There are many reasons for this, ranging from unsuitable power grids and overpriced vehicles to an insufficient charging infrastructure. As Rose pointed out, almost two thirds of all charging stations in the EU are concentrated in three countries: the Netherlands, Germany, and France. Rose expects electric vehicles to have a significant impact on the worldwide demand for oil, with a decline of 1.5 million barrel (159 litres) per day after 2030. Total production worldwide is currently at 100 million barrels of crude oil per day, of which one third is used for transport.

Net zero by 2050

Oil companies like BP, however, already began their transformation into energy companies years ago, as BP Vice President **Rebecca Yates** explained in Vienna. "BP's objective is to become a net-zero company (*note: with respect to CO₂*) by 2050, or even earlier." The company's strategic goal is to increase the number of charging stations worldwide from 27,000 today to 100,000 by 2030.

Problem: Charging infrastructure for heavy transport

Developing a charging infrastructure for heavy transport is a particular challenge. The industry expects that in long-distance haulage, around half of the lorries in Europe will also be battery-driven in the future. The infrastructure envisaged for these vehicles will need megawatt charging systems. **Arnd Franz**, Chairman of the Management Board of supplier group Mahle explained that, as a result, lorry parking areas will require separate high-voltage connections and much more space. "There is already a shortage of around 23,000 parking spaces for lorries in Germany today, and another 21,000 parking spaces will be needed for electric charging." According to Franz, this opens "a clear opportunity for hydrogen".

Especially in combination with internal combustion engines in heavy transport, green hydrogen is currently considered a relatively quickly implementable and economical, climate-neutral alternative to diesel, an opinion held by many speakers at the symposium. Contrary to passenger cars, lorries are also considered "zero-emission vehicles" if they emit less than 1 gram of CO₂ per tonne-kilometre, even with a hydrogen engine. MAN plans to launch the first European lorry with a hydrogen engine in 2025.

From the point of view of Mahle, however, one should not disregard synthetic fuels. These fuels, also known as e-fuels, are produced using green hydrogen and CO₂ captured from industrial emissions. Due to the more elaborate generation process involved, they are more expensive and have a poorer energy balance compared to the direct use of green electricity in batteries. Yet they do offer significant advantages: In many respects, e-fuels are seen as the best solution for decarbonising transport sectors like container shipping or long-distance air travel. In contrast, the potential of biofuels as an alternative to fossil fuels in transport is considered limited due to their possible competition with food production.

E-fuels, including green hydrogen, also seem an attractive storage option for green electricity, since it can be transported over very long distances as easily as crude oil. This will be especially important for Europe, which will be highly dependent on imports if it is to achieve the energy transition. "In Europe, the share of fossil energy sources in the generation of primary electricity is still almost 40 percent", ÖVK Chairman Bernhard Geringer explained. This percentage is even higher in the case of primary energy.

Experts also attribute a great future potential to CO₂-neutral fuels for passenger cars. Even more so considering that no ban on internal combustion engines in passenger cars exists outside Europe. Especially in emerging economies like India, their number is even expected to rise. By using sustainable fuels, passenger cars can also be emission-free if their overall lifecycle is taken into account, rather than the emissions from their exhaust system alone. Moreover, this can be achieved at a much lower cost than with battery electric powertrains, as **Michael Fleiss**, Managing Director of powertrain developer Aurobay Europe explained. Fleiss added that, according to a study by Bloomberg, 900 million internal combustion vehicles and 600 million battery electric vehicles worldwide will be on the road by 2040.

World's largest manufacturer of internal combustion powertrains emerges in China

Aurobay was founded in 2021 and comprises the combustion engine division (from development to production of engines and transmissions) of Chinese carmaker Geely and its European subsidiary Volvo. A joint venture with the combustion engine division of Renault is planned for this year. "This will result in the world's largest independent powertrain manufacturer, producing five million powertrains per year." The company will also develop and build modern internal combustion engines and transmissions for other international car makers who can no longer afford their own engine development and who wish to focus exclusively on battery electric powertrains.

Great potential in agriculture

The objective of reducing the environmental footprint in agriculture is particularly challenging. Converting a 25-ton combine harvester to run on batteries is a truly daunting task. **Friedrich Eichler**, Chief Technology Officer at Steyr's parent company Case New Holland (CNH) Industrial believes that agriculture offers a lot of potential for phasing out fossil fuels. By using the methane generated from the slurry of 45 to 100 cows, for instance, it is possible to supply an entire farm with sufficient green electricity and even biogas to run the tractor. Over a period of 100 years, the potential greenhouse impact of methane is 28 times higher than that of CO₂. By preventing it from being released into the atmosphere and capturing it to generate fuel or electricity instead, "we create a negative CO₂ footprint. Currently no electric vehicle can deliver this", said Eichler. CNH already has small tractors and construction machines with battery electric powertrains on offer. A Steyr tractor with a fuel cell powertrain was on display outside the Hofburg. The hydrogen required to power the tractor can be generated using e.g. wood chips. In this respect, CNH is currently cooperating with a Carinthia-based company that plans to launch production this autumn. According to Eichler, cost efficiency is vital for the future success of individual technologies, especially with regard to farmers.

The around 80 presentations at the 2024 Motor Symposium demonstrated that "the gigantic transformation process currently required in the automobile industry also gives rise to opportunities." (Helmut List, CEO of AVL List) According to VW's Michael Steiner, in order to secure the future of the European car industry, "we must more than ever before adjust to the requirements of the customer, and not to what we believe is right or best." In his final address, **Helmut Eichlseder**, Vice Chairman of ÖVK pointed out to major challenges ahead for the industry and for legislators en route to climate neutrality: "What is essential for all powertrains (*note: battery electric, fuel cell, or internal combustion engines*) is a regenerative energy supply. In combination with the necessary infrastructure, this represents a mammoth task that has not yet been thought through."

Short info on the Austrian Society of Automotive Engineers

The Austrian Society of Automotive Engineers (ÖVK) was founded in 1985 and has 750 full members. Its objective is to promote the useful application of automotive engineering. The ÖVK organises scientific events in an effort to enhance and promote the level of knowledge among mechanical engineering experts and other relevant target groups. The International Vienna Motor Symposium was initiated by Professor Hans Peter Lenz. It took place for the first time in 1979 and has been organised by ÖVK since 1985. Professor Dr. Bernhard Geringer has been the Chairman of the ÖVK since 2017.

More information at <https://wiener-motorensymposium.at/> and <https://oevk.at/>

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