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VDE presents “Drive portfolio of the future” study – long version

- **VDE brings the views of mobility experts from politics and business together for the first time**
- **The drive portfolio of the future in road transport – for cars: batteries, for trucks: batteries/fuel cells, for others: e-fuels**
- **Business, politics and the wider public must work together**
- **Focus on strengthening the German economy and securing jobs**

(Frankfurt, April 30, 2021) The technology organization VDE presented its new mobility study “Drive portfolio of the future” in a virtual press conference today. The study revolved around the following central questions: Do politics and business have similar assessments and expectations of the drive portfolio of the future? And what will it take to successfully get the general public on board and maintain Germany’s leading position in international competition? VDE has collected the assessments and expectations of eight leading experts from politics (including the chairman of the Bundestag committee on transport and digital infrastructure) and 19 experts from the business community (including top management at OEMs, suppliers and energy companies). The results are now available in the form of a first expert opinion report. The main message: Only with an intelligent mix of all available climate-neutral drive technologies – batteries, fuel cells and e-fuels – can the EU’s ambitious zero-emission climate goal be met.

Keeping the population’s needs in mind

The 2030+ drive portfolio must be balanced, ecological and geared to the needs of the population. “Only then will the task of transforming mobility as part of the climate policy target corridor be possible for society as a whole. Future mobility must be locally emission-free, convenient and affordable. This includes climate-friendly solutions for individual transport as well as for local public transit and freight transport,” explains Dr. Ralf Petri, head of the Mobility Division at VDE. In the coming years, the respondents from politics and business are in favor of

VDE Association for Electrical Electronic & Information Technologies
Editor in Chief Head of Brand, Marketing and Communication: Thomas M. Koller
Stresemannallee 15
60596 Frankfurt am Main
www.vde.com
service@vde.com

using each of the respective drive technologies according to their specific strengths. As the VDE study concludes, they are committed to the following 2030+ drive portfolio for road traffic: battery-electric drives in passenger cars, batteries and fuel cell drives for transporting freight and heavy goods (depending on the application), and e-fuels as a niche or transitional drive technology for existing vehicles and special uses such as motor sports and vintage cars. The basis for the transformation is a constructive and continuous dialog between politics and business, whereby the wider public must also be incorporated and actively involved.

Focus on batteries

Especially for passenger cars, the battery-electric drive is the best alternative to vehicles with an internal combustion engine. On the one hand, the locally CO_2-neutral drive technology is the most widely used, and a fundamental grid infrastructure is available across the country. Another major strength is its efficiency, as it requires the least primary energy of all the drive technologies studied. The biggest challenge lies in constructing and expanding a charging infrastructure to meet the future demand. As the number of electric vehicles increases, the experts surveyed expect capacity bottlenecks in the future, which will require solutions in the form of network expansion and intelligent load management. Most importantly, the number and distribution of both public and private charging points must be rapidly expanded in a user-oriented manner. “Extensive coverage must be ensured to achieve broad acceptance among the population. A user-oriented range of charging point options is also required. In any case, measures must be implemented quickly here,” Petri says. The respondents expect major technological advances and a significant increase in energy density with a simultaneous reduction in battery costs in the next few years, which means that the battery-electric drive will continue to be the most efficient and predominant drive technology in passenger cars.

Focus on fuel cells

In contrast to the battery, the experts expect hardly any major technological advances in the area of fuel cells in the coming years. Even the greatest disadvantage – a high primary energy requirement resulting in low efficiency – will not change significantly. In individual passenger transport, the fuel cell will therefore account for only a small proportion of the drive portfolio in the near future. The picture is very different, though, in heavy-load and long-haul freight transport as well as in the areas of rail, shipping and aviation. The fuel cell plays to its strengths here: high energy density over long distances. Today, the transport of heavy goods accounts for around one third of CO_2 emissions for the entire transportation sector. For this reason, the fuel cell is an important component on the path to locally CO_2-neutral mobility in these applications. The crucial point here is that applications use “green” hydrogen produced from renewable energy sources. Here, too, there are major challenges with regard to infrastructure expansion. The question of whether the existing natural gas network can be used to distribute hydrogen

has not yet been resolved, nor has the feasibility of importing green hydrogen from suitable regions to diversify geopolitical dependencies.

Focus on e-fuels

E-fuels are electricity-based fuels produced using renewable energies, making them locally emission-free ("power-to-fuel"). In addition to solar energy, they can be obtained from ammonia, methane or by electrolysis from green hydrogen. Their major advantage is that they are very simple to handle, since they can be easily fed into and used in the existing infrastructure of pipelines, transport vehicles, filling stations, gas pumps and conventional internal combustion engines. However, generating these e-fuels requires on average six to eight times the amount of primary energy compared to the battery-electric drive. The expected prices for e-fuels are correspondingly high. "It's conceivable that e-fuels will remain relevant for a niche market of existing vehicles with internal combustion engines – particularly where consumers are prepared to pay a lot, such as enthusiasts wanting to drive vintage cars or motorsport cars," Petri adds. Applications for the aviation industry are also being tested in various stages of development.

The biggest challenge: synchronizing political and business measures

Achieving climate goals will require a continuous, constructive dialog between the political and business sectors to synchronize the expansion of adequate charging and distribution infrastructure on the part of politics and the expansion of vehicle model ranges on the part of private companies. "We can only achieve our goals if all actors join forces and work together on the transformation of mobility," Petri concludes. There is consensus among experts from both politics and business: zero emissions by 2050 is the target. Conversely, this will mean a fundamental shift for the entire economy and a change in the public's thinking. "The mobility and drives of the future require a locally CO_2-neutral drive portfolio based on an intelligent mix of all available climate-neutral drive technologies.

A single-minded focus on one innovative drive type would be just as much of a dead end as uncoordinated action by individual actors or ignoring user views and behavior. Achieving a reduction in energy consumption by around 40 percent in the transport sector by 2050, as intended in the energy strategy, therefore requires an innovative drive portfolio and a common understanding of the joint implementation. We can only get this going if all the gears mesh together smoothly. Starting with the production of energy sources, through to the production of vehicles and all the way to the development of sustainable infrastructure and a new awareness of mobility among the population," Dr. Ralf Petri, head of the Mobility Division at VDE, explains the essential vision, but also the crux of the challenge.

The challenges from the perspective of **politics**:

- Openness to multiple technologies when supporting the conversion to emission-free mobility in the market ramp-up phase
- Taking advantage of the strengths of the battery-electric drive and systematically boosting its optimization potential
- Preference for the potential of “green” hydrogen for Germany as a business and technology location
- Leveraging synergies of state funding policy and entrepreneurial investment capital
- Consideration of geopolitical and fiscal challenges

Business sees the following challenges:

- Integrating infrastructure development and the production of new vehicles
- Accelerating expansion of the electricity grid and the provision of renewable energies
- Designing long-term framework conditions for investment security
- Continuing and intensifying the dialog between politics and business
- Communicating a positive vision of climate-neutral mobility to end customers

The political and business experts surveyed for the study formulated **five recommendations for action**:

1. Expand and institutionalize the dialog between politics and business
2. Promote infrastructure in a targeted manner with a focus on the generation, distribution and provision of sustainably produced electricity and hydrogen
3. Remove regulatory hurdles
4. Improve access to capital for major innovation projects
5. Optimize end-customer communication and the state’s role model function

About the VDE study

The VDE study “Drive portfolio of the future” is a research and development project of the collaborative ELSTA project for promotion of electromobility through standardization funded by the German Federal Ministry for Economic Affairs and Energy (BMWi). The participating project partners include members of the German Institute for Standardization (DIN), the standardization committee of the German Association of the Automotive Industry (VDA-NA Automobil) and the German Commission for Electrical, Electronic & Information Technologies of DIN and VDE (DKE). Their work is closely coordinated with the National Platform Future of Mobility (NPM), which was founded to coordinate national activities. The study was conducted between April 2020 and March 2021. The project work involved coordinating and leading a dialog process between the political and business stakeholders as well as documenting, summarizing and publishing the results and findings. The study is available free of charge (in German) at www.vde.com/shop.

About VDE:

VDE, one of the largest technology organizations in Europe, has been regarded as a synonym for innovation and technological progress for more than 125 years. VDE is the only organization in the world that combines science, standardization, testing, certification, and application consulting under one umbrella. The VDE mark has been synonymous with the highest safety standards and consumer protection for 100 years. Our passion is the advancement of technology, the next generation of engineers and technologists, and lifelong learning and career development “on the job”. Within the VDE network 2,000 employees at over 60 locations worldwide, more than 100,000 honorary experts, and 1,500 companies are dedicated to ensuring a future worth living: networked, digital, electrical. We shape the e-dialistic future.

The headquarters of the VDE (Association for Electrical, Electronic & Information Technologies) is in Frankfurt am Main. For more information visit www.vde.com.

Press contact: Melanie Unseld, Tel. +49 69 6308-461, melanie.unseld@vde.com