Holistic Approach to Future Mobility

Electric Power Trains and Energy Storage Were in the Focus of the 2011 KIT Annual Reception

Dr. E. h. Martin Herrenknecht was appointed honorary senator by the KIT Presidents (from left to right: Eberhard Umbach, Martin Herrenknecht, Horst Hippler). (Photo: Markus Breig, KIT)

Mobility and energy, topics that are closely interconnected and move everybody, were in the focus of this year's KIT Annual Reception. As emphasized by the Presidents, Professor Eberhard Umbach and Professor Horst Hippler, a holistic approach is required to design future mobility as user-friendly, sustainable, and inexpensive as possible. As an example, the current activities of KIT in the fields of electromobility and energy storage were presented at the Reception.

The 2011 KIT Annual Reception at the Karlsruhe University of Arts and Design (HfG) started under the impression of the events in Japan. The KIT Presidents expressed their sympathy with the people affected. As underlined by Horst Hippler, it is the task of a research and education institution like KIT to act in such a dramatic situation. Hippler referred to the six working groups established by KIT on behalf of the Helmholtz Association to evaluate the events in Japan as well as to the regional radiation protection center on KIT Campus North that offers body counter examination and advice to persons who stayed in the areas affected. Eberhard Umbach expressed his

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wish for more thoughtfulness in the German energy debate that has been relaunched due to the events in Japan.

Like energy, mobility is a key requirement of our society. Research has to develop solutions to cover the increasing energy demand due to growing mobility. Climate compatibility, environmental protection, costs, and efficiency, but also safety and user friendliness are of crucial importance. “Our scientific fields of work extend from the user behavior to electromobility to new traffic concepts for conurbations” explained Umbach. “KIT is pursuing a holistic approach to research. This makes it an interesting partner for industry.” He pointed out that KIT electromobility research covers the complete chain of value added. Presently, about 250 employees from 22 KIT institutes are working on this topic.

KIT is facing the challenges associated with electromobility and energy storage in various projects: “Competence E” represents the superordinate project pooling all KIT activities relating to electric energy stores and power trains. Scientists of the KIT Energy, NanoMicro, and Mobility Systems Centers as well as from the Humans and Technology Focus are making decisive contributions. The “Smart Home” at KIT, a test laboratory of the MeRegioMobil Initiative, integrates electric vehicles as electricity stores in an energy-efficient household. At the “BELLA” (Batteries and Electrochemistry Laboratory) joint laboratory, KIT and BASF SE will develop tomorrow’s battery materials. Together with Ulm University, KIT has founded the Ulm Helmholtz Institute (HIU) for Electrochemical Energy Storage. Associated partners are the German Aerospace Center (DLR), also member of the Helmholtz Association, and the Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW). Moreover, KIT and Daimler AG will establish a joint Ph. D. research group on electromobility funded by the Baden-Württemberg Ministry of Science and, thus, extend their research cooperation under the “Project House E-Drive”.

In his welcome address, Dr. Dieter Zetsche, CEO of Daimler AG and member of the KIT Supervisory Board, said that transition from the combustion engine to electromobility is a long-term process. According to Zetsche, high-tech combustion engines will continue to play an important role for many years before they will finance their own abolition. Zetsche considers the ultimate goal to be purely electric mobility. In his opinion, Baden-Württemberg is predestined to establish a “lighthouse of electromobility” as here is where renowned companies, medium-sized suppliers, and close-to-practice research institutions are located.

When will electromobility be competitive on the market? The coordinator of “Competence E”, Dr. Andreas Gutsch, estimated that it will take another 60 to 80 years until electromobility will have a 100% share on the market. “Often, there are long phases in which technologies exist in parallel – this will also apply to the combustion engine and the electric power train.” Gutsch thinks that the local absence of emission and the possibility of transforming solar energy into individual mobility are the drivers of electromobility. Now, research is facing the challenge of reducing costs. “Cost drivers are not the basic resources, but fabrication and process technologies.” As was explained by Gutsch, KIT has an excellent standing in fundamental research. KIT researchers are working on new battery materials of high energy density.

The state of the art and perspectives of battery research were discussed by the presenter of the KIT Annual Reception, Markus Brock from the SWR broadcasting station, and Professor Dieter Jahn, Senior Vice President of BASF SE, Professor Horst Hahn, coordinator of the Ulm Helmholtz Institute – Electrochemical Energy Storage and Scientific Spokesman of the KIT NanoMicro Center, Professor Frank Gauterin, Scientific Spokesman of the KIT Mobility Systems Center, and Dr. Margret Wohlfahrt-Mehrens, Head of the Electrochemical Materials Development Division of the Center for Solar Energy and Hydrogen Research, Baden-Württemberg. It became obvious in the course of the discussion that the increase in storage density, power density, lifetime, and safety of the batteries as well as their integration in the vehicles will require cooperation of natural scientists and engineers of various disciplines.

With Professor Wolfram Münch, Head of the Research and Innovation Division of EnBW Energie Baden-Württemberg AG, Anke Eßer-Frey, young scientist at the KIT Institute for Industrial Production, and Professor Hartmut Schmeck, Spokesman of the MeRegioMobil project at KIT and Scientific Spokesman of the KIT COMMputation Focus, Markus Brock talked about the design of the “Smart Home” demonstration laboratory and first practical experience with the test inhabitants. The Smart Home is equipped with typical consumers and decentralized electricity producers. A photovoltaic system and a micro co-generation system produce electricity. Consumers are conventional as well as “smart” devices, i.e. controllable electric appliances. Electric cars are integrated as stores and consumers.

The program of the Annual Reception also included the conferral of a special honor. The KIT Presidents conferred the honorary sena-

torship to Dr. E. h. Martin Herrenknecht. The CEO of Herrenknecht AG, an engineer, considerably influenced the further development of automated tunneling technology. His company assumes a leading position in tunneling technology worldwide. Herrenknecht had been honored several times before for his services to society. Among others, he had been granted the Federal Cross of Merit, First Class. At KIT, he has been supporting civil engineering for several years now. Since 2008, Herrenknecht AG has been funding a five-year endowed professorship for Technical Petrophysics at the Geothermal Energy Division of the Department of Civil Engineering, Geo and Environmental Sciences.

The Honorary Senatorship of KIT has a long tradition. It was introduced in 1925 by the former Technical University of Karlsruhe in order to honor renowned persons for their outstanding services to the university. Dr. Martin Herrenknecht was granted the first honorary senatorship after the merger of both precursory institutions into KIT.

The KIT Annual Reception was sponsored by Daimler AG and Toyota Motorsport GmbH.