

Planning, approval, construction and commissioning of the e highway route on the BAB 1 in Schleswig-Holstein

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Summary

The talk describes the planning, approval, construction, and commissioning of the test track for the eHighway at the autobahn A1 in Schleswig Holstein. The goals of the project are pointed out and an intermediate status is given about the project. Also, the experiences made up so far are illustrated vividly.

1 Research Questions

Due to the large amount of emissions produced by heavy traffic in Germany, climate friendly solutions are necessary to reduce the impact of transportation by truck. Electrically powered commercial trucks require space-consuming heavy batteries, which reduces efficiency and increases cost or loading time. An alternative are diesel-electric hybrids that charge their batteries via overhead power lines while driving. From 2019, overhead line trucks will be tested in practice on three routes in Germany – in Schleswig-Holstein, Hessen and Baden-Württemberg. This eHighway concept will be checked in Schleswig-Holstein (BMU funded project FESH) to determine whether it represents a practicable solution for the future.

Economic, ecological and psychological aspects will be taken into account during the field test, as well as issues regarding traffic and energy. The aim of the project is to contribute to a lower-emission transport of goods by road. In addition to the analysis focuses on functionality and reliability of the new vehicle and infrastructure system in real operation, a system evaluation is carried out under ecological and economic aspects.

The research questions pursued by the project are primarily derived from the realization of a pilot route in public street space as well as a realistic electrical operation of these vehicles on the overhead power line. This takes into account the overriding objective of having ready and reliable electrification options available for all modes of transport and tasks within the next few years.

2 Methodology

Ten kilometres of overhead lines are currently being installed in both directions along a section of the autobahn A1 near Lübeck to power freight traffic. The cables will be held up by masts standing next to the road, and the electricity running through them will be used to power the electric motors of specially equipped trucks. These trucks will be equipped with so-called pantographs, mounted above the driver's cab.

The electricity will be transferred through these pantographs to the trucks' electric motors. When the truck is not connected to the overhead line system, a diesel-hybrid drivetrain takes over.

The project FESH deals with specific issues relating to the operational management of the infrastructure inclusively operating procedure, energy network, emergency management, ecological accounting, traffic safety, as well as system acceptance issues and various logistics concepts within the framework of scientific accompanying research. Also, framework conditions are developed and financing models and incentive systems are discussed, which can enable market penetration. Furthermore, one focus of attention is on the legal basic requirements of the regulatory.

3 Results

After preparation of a preliminary and draft planning as well as an implementation plan and a positive environmental impact assessment, the construction of the route was advertised and the construction subsequently awarded to a consortium. The eHighway test track will be completed in May of this year.

The lecture presents the test track for the eHighway on the Federal Highway 1 in Schleswig-Holstein. The reasons why this section of the line has been selected and is particularly suitable for system testing are explained. The process of the first planning steps and the special challenges in the integration and the construction of a new technology are explained and presented. Due to the legal requirements, a complex approval process has been completed. The boundary conditions, the parties involved, the experience gained and the difficulties that arose during the approval process are - in the sense of transferability to other routes - demonstrated in a comprehensible manner. During the planning, approval and construction phase, the legal, nature conservation requirements played a special role. This page of the project is also illustrated in the lecture. The experiences made during the preparation of the construction and the construction of the overhead line are illustrated and explained. Many of the experiences gained are transferable to other routes in the event of system expansion. At the end of the lecture an outlook on the operational phase planned after commissioning and the accompanying scientific research will be given.

In Germany, it is the first time that a construction of overhead wires in public space is realized. The concepts for operation, incident and maintenance developed in this project are to be made available to authorities and future operators. The experiences gained during construction and operation are passed on in regular exchanges with interested companies, associations and authorities and also published in part. They are thus directly available to the groups involved in the expansion of electromobility and are incorporated into the optimization of the processes for expanding electromobility.

At the end of the project period in 2022, the recorded experiences of the participating logistics companies, maintenance companies and other stakeholders, as well as the rescue and emergency services, will be brought together in report form in order to make them usable for track extension and other projects of this type. Even a necessary market model can only emerge with the analysis of field trials and the necessary standardization of technological interfaces (overhead lines, pantographs, billing systems, etc.).



Figure 1: Construction of the overhead power line on the autobahn A1

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Author



Björn Lehmann-Matthaei has been General Manager of the Forschungs- und Entwicklungszentrum Fachhochschule Kiel GmbH since 2000. Before that position he worked in the automotive supplier industry (Robert Bosch) as project manager in railway industry (Faiveley SA) in management position. He has an education as Mechanical Engineer and postgraduate study in Business Administration. In his position he has a wide experience to accompany highly technology engineering projects, which also includes experience with national- and EU-funding in various programs. He has many years of experience in the organization and project management of small and large international projects, as well with industrial partners and research partners.