



1 ICT components in an electric vehicle charging station. Image: Dr. Thoralf Winkler, Fraunhofer IFF

2 Control system that monitors the smart grid. Image: Christoph Wenge, Fraunhofer IFF

## HARDWARE AND SOFTWARE COMPONENTS FOR SMART POWER SYSTEMS

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### State-of-the-Art Information and Communications Technologies Make It Possible.

A life without electricity is inconceivable for most people. The electrical grids that transport electricity from producers to consumers will be confronted by new challenges in the future. For instance, more electricity will be supplied by renewable producers, which, however, will cause incoming power to vary. Assuring the supply of electricity in the future nonetheless will necessitate modifying the power supply system for these challenges.

The electric power grid will have to respond to its current situation flexibly in order to integrate the rising number of renewable energy sources. In addition, smart loads and electricity storage systems will be needed to adjust the volatility of generation to consumption.

Monitoring and controlling this increasingly complex system will necessitate developing new technologies, such as high-precision meters or standardized communication between the electric power grid's components, and implementing them in a holistic systems approach.

### Benefit from Our Services

Our services enable us to assure the cost effectiveness, environmental compatibility and dependability of electric power grids by providing solutions aimed at uniformly utilizing the electrical grid to capacity. In addition, we maximize the integration of renewable energies to ensure that the interplay of consumption, power storage and distributed generation is optimal. Such ICT components might be control systems, smart phone apps with value adding s

ervices for electric vehicle users or components in the charging infrastructure that implement the standard IEC 61851-1.

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### **Profit from Our Services**

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The Fraunhofer IFF is your partner for designing, developing and automating testing of custom hardware and software components for the smart grid of tomorrow. We provide the following related services:

- Creation and implementation of holistic systems approaches
- Design and implementation of system components
- Development and implementation of specifications for communication between system components
- Development of test procedures for system components

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### **Design and Implementation of Holistic Systems Approaches**

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The Fraunhofer IFF's experts develop holistic approaches to electric power grids including the necessary information and communications technologies. In the process, we analyze every potential component from vehicle batteries to charging stations and mobile electric vehicle applications and even the higher-level control system that controls the smart grid. To do so, we specify standards with which such systems must comply, develop holistic data schemes and architecture specifications and implement them.

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### **Design and Implementation of System Components**

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The Fraunhofer IFF designs and implements individual system components required in a smart grid. To do so, requirements analyses are performed and documented and pertinent hardware and software specifications are compiled and implemented properly.

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### **Development and Implementation Concepts for Communication between System Components**

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The smart grid's system components must intercommunicate and exchange information. The Fraunhofer IFF develops communication specifications based on standardized communication protocols and implements them.

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### **Development of Test Procedures for System Components**

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Some of the smart grid's system components, such as smart charging roadside stations or high precision meters in the field, must function in conformance with standards. The Fraunhofer IFF develops test procedures that verify conformance with standards and performs conformance tests on behalf of our clients.

The Fraunhofer IFF additionally provides coaching and support throughout the process of implementing innovative hardware and software solutions in electric power grids.

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### **Our Expertise Is Your Edge**

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We have the latest commercially available software development tools and apply state-of-the-art development and quality management processes. We incorporate the latest research findings in the design of custom solutions.

Please contact us if you are interested in learning more about our services for hardware and software components for smart grids. Our experts would be happy to provide you assistance.