

## Book of Abstracts

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## **Energy Efficiency**

### **Energy Efficiency in Electric Utility Vehicles**

Dr. Siegfried Götz, CEO MOTEG, Germany

As the battery capacity for electric vehicles is still limited, the energy efficiency of all electric devices within an electric vehicle is key.

So far most companies within this area have focused on the main electric propulsion. During several consultant work of Moteg engineers helping to convert Diesel bus fleets of customers to electric bus fleets we have shown, that the auxiliary aggregates for air pressure, oil pressure and heating are consuming a significant amount of energy.

Moteg is focusing now on auxiliary aggregates within the electric vehicles and is already developing their second generation with the possibility of nearly 100% re-usage of the energy, dissipated by the aggregates. In addition the aggregate size and weight is several times smaller and lighter than existing aggregates so far.

### **An efficient and cost-effective solution for heavy duty road transport**

Benjamin Wickert, Head of Business Development eHighway, Siemens AG

To meet constraints faced by road freight in terms of significantly lowering or reducing CO<sub>2</sub> emissions and improved air quality an Electric Road System (ERS), based on an Overhead Contact Line (OCL)-hybrid heavy-duty vehicle (HDV), has been designed, developed, tested and demonstrated. The ERS demonstrated has twice the energy efficiency of conventional diesel HDVs and enables usage of renewable energy. The technological development was made possible by combining expertise from rail electrification, electric drives and a newly developed active current collector for dynamically connecting to the OCL and receiving a continuous supply of electricity to power the engine and store energy on-board. The research project demonstrated that a hybrid truck can run in pure electric mode without any change in the operations for the driver and without concessions on truck performance. The presentation includes the latest results and points the way to a heavy-duty road freight system with full electric power and full flexibility.

### **Use of technology platforms to design fully customized power electronics for E-mobility**

Thomas Slivsgaard, CEO CONVERDAN, Denmark



Using technology platforms to design fully customized power electronics for E-mobility - with very short time-to-market, low project risks and without compromising quality, EMC, safety approvals, manufacturability and price.

The platform based product development model will be presented. Converdán A/S uses it very successfully to develop fully customized power electronics products in low to medium volume. This has traditionally not been an area, where full customization was a viable alternative over off-the-shelf, mainly because of the considerable investments required to bring the full product from idea to stable production.

Thursday 11.30 – 12.30

### **Putting Energy Efficiency first**

Flemming Lyngge Nielsen, Sustainability Director, Danfoss, Denmark

The best and cheapest energy is the energy we don't spend. Energy efficiency is the greenest and most cost-efficient way to mitigate climate change.

Putting global focus on energy efficiency in residential and commercial buildings, industries and cities enhances our ability to optimize our resource consumption by using the best available technologies to connect buildings and avoid wasting valuable energy. On one hand, it decreased both costs and CO<sub>2</sub> emissions, and on the other, it increases the livability markedly.

### **Closer to Climate neutrality with new Power Electronics solutions**

Teresita Qvarnström, RISE Acreo, Stockholm, Sweden

The construction of the climate neutral society demands the implementation of new technologies enabling a highly efficient use of power. Advanced power electronics solutions are key tools opening the path towards sustainable production, transport and consumption of energy.

The talk will present current efforts to promote the market uptake of advanced power electronic technologies for energy efficient solutions and show the impact of the new technologies on the path towards climate neutrality.

The *SiC Power Center*. A platform for cooperation between industry, research institutes and academia based in Stockholm, promoting the introduction of advanced power electronics in applications where high energy efficiency, compactness and high-temperature operation are a must.

The *Green Power Electronics* project. 17 organisations in the Baltic Sea Region working together to boost efficiency in conversion, transmission and consumption of energy and facilitate the industrial integration of new the technologies.

## Intelligent Energy Systems

### **The Swiss Energy Strategy 2050 – Future Challenges from a Control Theory Perspective for an Efficient Energy Management**

Dr. Annika Eichler, Automatic Control Laboratory, ETH Zürich

Facing the fundamental changes in energy supply and energy markets, the Swiss government has developed the Energy Strategy 2050 to prepare Switzerland for these challenges and to reduce its energy-related environmental impact. Against the backdrop of the Energy Strategy 2050, various research projects have been launched. With the SCCER FEEB&D (Swiss Competence Center for Energy Research on Future Energy Efficient Buildings & Districts) and IMES (Integration of sustainable Multi-Energy-hub Systems at neighborhood scale) two of these programs, where the Institute for Automatic Control at the ETH Zurich is involved, will be briefly introduced.

This talk emphasizes the future challenges imposed by the Energy Strategy for an efficient energy management from a control theory perspective. One of these challenges is the increasing infeed of renewables, which requires efficient control strategies to carefully take the uncertainties from environment and occupants into account. Moreover, the resulting demand for storage systems, raises the importance of storage management solutions that integrate different time scales to efficiently manage short-term decisions with seasonal planning.

### **Agent.HyGrid: A desirable way to design and build standardized and intelligent on-site software components for Smart Grids that are called Energy Agents**

Christian Derksen, Dipl.-Ing., Institute for Computer Science and Business Information Systems  
University of Duisburg-Essen, Germany

The Agent.HyGrid project intends to define a systematic development process that allows to seamlessly use intelligent Energy Agents in simulations, in testbed applications and in real on-site applications. Therefore, a clear and comprehensive software structure is required that considers the interfaces between an Energy Agent and its direct environment. Furthermore, a knowledge and action model is required that enables agents to understand and control an assigned technical system or an aggregation of technical systems in a suitable manner.

Along an example of an electrical distribution network, both, the Energy Agent structure, as well as the knowledge model for hybrid energy conversion systems will be presented in this talk.

### **Multi-objective model predictive control for smart and energy flexible buildings**

Dr. Arendt Krzysztof, University of Southern Denmark

Renewable energy sources and smart grids introduce new challenges for buildings. It is becoming clear that the traditional rule-based approach to control building systems is not sufficient to face these challenges. Buildings of the future should be energy flexible to help stabilize the grid without compromising the indoor comfort of occupants. Center for Energy Informatics conducts a research focusing on new multi-objective control strategies for buildings, that will increase the energy flexibility and coordinate the operation of building systems based on the anticipated weather conditions and occupancy patterns. Krzysztof Arendt will present the center's activities in this area, with a particular emphasis on the role of building simulation in the next-generation control systems.

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### **Participatory Aspects**

**Thursday 9.40 – 11.10**

#### **Participatory Approaches to Energy Planning: Insights from Tunisia**

Ms Shahrazad Far, Bonn International Center for Conversion, Germany

Long-term energy planning is an elaborate and forward-looking undertaking involving multiple stakeholders and a multiplicity of relevant factors. Establishing a national vision around which the different stakeholders can rally is important for enhancing the efforts towards its implementation. For that, participatory and inclusionary approaches can prove to be key in such a process. This presentation aims to provide an example of participatory and inclusionary approaches devised in the framework of the research project on Middle East and North Africa Sustainable Electricity Trajectories (MENA SELECT). It will highlight the methodology used and the insights from results from the project's work in Tunisia.

#### **Jordan's future power supply – development of scenarios in a collaborative approach**

Sönke Bohm, Europa Universität Flensburg, Germany

While other research studies on future power systems often tend to focus on potentials, long-term targets or cost-optimization, in the MENA SELECT research project special emphasis is put on the development of scenarios based on the views, estimates and anticipation of relevant stakeholders. During on-site workshops in Jordan, representatives from various local societal groups were asked to state their expectations about the country's energetic future and develop



consistent scenarios with a model provided. This presentation will highlight the approach and outcomes of workshops conducted in Jordan in March 2017.

**Key Actors drive local climate protection: The role of individuals in cities' efforts to reach CO2-neutrality**

Martin Beer, Europa-Universität Flensburg

The implementation of local mitigation strategies will be successful if committed individuals become active in climate protection and take things in their hands. The transformation to a climate-friendly city depends on experts, decision-makers and citizens who are willing to engage and who have a good reputation in local society. The presentation provides information on how to identify, activate and include these key actors to play a role in the efforts for climate protection based on the findings of eight case studies which were carried out in German cities.

## **International Green Entrepreneurship Forum**

### **Smart Cities for Evolving Entrepreneurship: How Smart Technologies are Facilitating Entrepreneurship and Innovation in Smart Urban Ecosystems**

Prof. Dr. Jay Mitra, Universtiy of Essex, U.K.

Smart technologies, smart cities and smart enterprises appear to have acquired a level of significance which may be in keeping with the rapid advances made on the technology frontier. How we keep up with the whirligig of software, sensors, apps, artificial intelligence, nano and other technologies, has become a critical issue for entrepreneurs, policy makers and policy makers. On the one hand we have this extraordinary proliferation of technologies, and on the other we find the rather confused response that we make as entrepreneurs, decision makers and citizens in shaping new ventures that can mobilise these resources creatively in especially urban environments. Somewhere in the middle lie opportunities. In this presentation I will explore critically the urban context of smart, productive entrepreneurial responses to the issues stated above.

### **Institutional entrepreneurship for more sustainable development in cities**

Prof. Dr. Ursula Weisenfeld, Leuphana University Lüneburg, Germany

The transition to a more sustainable development of cities needs many innovations. We argue that a new institutional logic, in particular a 'sustainability logic' is needed in order to achieve a transition. How can such an institutional logic be brought into being? Who are the institutional entrepreneurs to further the transition to a more sustainable city? Using the German city Hanover as an example institutional entrepreneurship for sustainability is discussed.