Unique large-scale battery storage system

The world’s first modular large-scale battery storage system in the five-megawatt power class is currently being built in Aachen. ISEA is supporting the project with its expertise in the fields of battery technologies, battery aging, and battery system technology.

Standalone power supply for pipelines

As part of the EURHOPE research project, ISEA is involved in developing an uninterruptible power supply for pipelines. In addition, there are plans to replace the diesel generators previously in use with fuel cell systems.

Dear Readers,

power electronics, drives, and energy storage systems remain important key components as we move toward the transformation of the energy system and get transportation ready for the future. We are pleased to be able to present to you updated research topics in this issue. Dialogue and sharing of ideas in the research sector are especially important to us, so the appendix also includes the calls for papers for major conferences for which we have shared scientific responsibility for many years. With the foundation of the Helmholtz Institute HI MS "Ionics in Energy Storage," a new professorship in the field of aging and modeling of batteries is being established, with its headquarters at ISEA. The job posting is also attached for your information and to pass along to potential candidates who may be interested.

Publisher Elsevier is also filling a gap in its scientific journals with the launch of the new Journal of Energy Storage. As the journal’s editor, I plan to focus in particular on the heavily interdisciplinary nature of the topic of storage. Article submissions are welcome!

Warm wishes,
Dirk Uwe Sauer

ISEA supports Formula Student Team

As part of ISEA’s support for the Formula Student Team from RWTH Aachen University, EcurieAix. The team’s electric motor for this year, including the inverter, was characterized at an ISEA testing facility. In the Formula Student program, teams from universities all over the world compete in various events (Endurance, Skidpad, Acceleration) with electrically driven racing cars they have built themselves.

The engine used is a 40-pole transversal flux PM from Compact Dynamics with a peak output power of 40 kW and a maximum

Thanks to the excellent testing infrastructure at ISEA, the team was able to perform all of the necessary measurements on the motor for the racing car.
torque of 90 Nm. The machine was purchased by EcurieAix as a full system, including inverter and control system. The measurements focused on the efficiency during motor and generator operation, as well as determining back-EMF and drag loss. EcurieAix is planning to equip the vehicle with a higher-level control system, including torque vectoring, so the team also needed to compare the estimated torque in the controls with the actual torque in order to correct errors. Water through-flow and temperature were also measured at three different points in the cooling system in order to verify its dimensioning.

**Power Electronics/Storage Systems | Research project**

Clean and efficient: Standalone power supply for pipelines with fuel cells

As part of the German-Russian research project EURHOPE, the partners are developing an uninterruptible power supply with power of 1 kW and 48 V output voltage for the gas and oil industry. The goal of the project, which is receiving funding from the German Federal Ministry of Education and Research (BMBF) as part of the CLIENT funding program (http://www.fona.de/de/9862), is to reduce CO₂ emissions in these applications.

To that end, the diesel generators previously used to generate power along the pipelines are to be replaced with fuel cell systems. Their HT PEM (High Temperature Polymer Electrolyte Membrane) cells will be supplied with fuel directly from the pipeline via reformers. To support the start process and compensate for load fluctuations, a lithium-ion battery will be used. The different voltage levels will be connected via various power electronic components. Due to the climate conditions along the pipeline, the system has to function reliably at ambient temperatures from -40°C up to +50°C.

ISEA is involved in this project with its Battery System Technology and Power Electronics research groups.

The power electronics developed for the system consist of three converters that are connected with the other components (see graphic). The galvanically isolated converter at the fuel cell determines the operation point of the fuel cell and assures constant power generation. The converter on the battery side compensates for load fluctuations by regulating the output voltage. At the same time, it prevents charging of the battery if the battery is not currently able to absorb any energy. Excess energy from the fuel cell is discharged to a resistor via a chopper.

One particular challenge for the battery system is the range of possible ambient temperatures. Both cooling and heating aspects need to be taken into account. Thermal simulations based on CAD models, characterization measurements and characteristic temperature profiles have shown, however, that active cooling is not necessarily required. Heating, on the other hand, is essential when lithium-ion batteries are used, in order to enable flawless operation in all conceivable cases. Although the cells can be discharged reliably even at very low temperatures and warm up in the process, there could be operating cases in which the cell temperature is not high enough to ensure safe charging.

**Storage Systems | Research project**

Unique large-scale battery storage system being constructed in Aachen

Germany’s energy transition needs storage. Alongside storage facilities to help compensate for long-term fluctuations in generation and demand over the course of the year, buffer storage is also needed to help compensate for short- and medium-term dips in production or peaks in demand. The world’s first large-scale modular battery storage system in the five-megawatt power class is currently being built in Aachen for just these short- and medium-term uses. The project, entitled MSBAT (Modular Multi-Megawatt Multi-Technology Medium-Voltage Battery Storage), encompasses 12.5 million euros in investment and R&D. The German Federal Ministry of Economics and Energy is providing about half of the total, with 6.5 million euros in funding as part of its Energy Storage Funding Initiative.
The project management and responsibility for operating the storage system is with the Institute for Power Generation and Storage Systems of the E.ON Energy Research Center at RWTH Aachen University. The other partners involved in this project are the RWTH Institute of Power Systems and Power Economics (IAEW), the energy provider E.ON SE, battery manufacturers Exide Technologies and Beta-Motion, and inverter manufacturer SMA. ISEA is supporting the project with its expertise in the field of battery technologies, battery aging, and battery system technology.

Energy provider E.ON SE is handling the retrofitting of the existing building as well as the technical implementation of marketing of the electrical energy for various applications in the energy market. The above-mentioned manufacturers will supply the various components. All of the partners will be working together over four years to optimize the structure, construction, and operation of these kinds of large-scale battery storage systems. Construction work is scheduled to start this fall, with the large-scale battery storage system going into operation in 2015. In principle, additional innovative battery technologies can also be operated and tested here in the future.

What makes M5BAT distinctive, aside from its size, is the modular structure of the storage system. Different battery technologies are being combined across five banks. Two lithium-ion banks will serve above all to provide short-term compensation for up to 36 minutes. These batteries feature high output and accordingly fast charge/discharge cycles, but are still more expensive than lead-acid batteries, which will account for two other banks. Assuming a full charge, these batteries will discharge the rated output over a period of about one hour. The fifth bank of batteries will consist of sodium nickel chloride high-temperature batteries that serve to provide energy for about two hours. Overall, the large-scale battery storage system, located on Aachen’s Hüttenstrasse, is designed to ensure that even if one bank fails, a reliable output of five megawatts can still be fed into the medium-voltage grid via the neighboring substation. Compared with conventional storage methods, battery storage systems have a number of advantages. Unlike pumped-storage hydroelectric plants or compressed-air energy storage, location decisions for batteries are completely independent of geographic circumstances, with economic and technical considerations being the deciding factors instead. Long periods of preliminary planning are not necessary, in part because it is relatively easy to accommodate environmental protection requirements in choosing a site.

Thanks to the modular structure with its multiple battery banks, the planned academic research to be performed as part of this project goes far beyond the field of technical layout and functionality of various storage techniques. The project will primarily be exploring ways to integrate electricity generated through renewables more easily into the complex supply system, but it will also look at whether, and if so how, the different banks and overall system can be operated for different markets in such a way as to minimize operating costs. To achieve this, it is necessary to understand aging behavior as well as electrical performance, efficiency, and cooling needs.

Short & Compact I
Diakonie social welfare station tests electric vehicle fleet
As part of the German federal government’s “Electric Mobility Showcase” initiative, the Diakonie social welfare station operated by Evangelisches Johannesstift in Berlin received five electric vehicles for free use on April 7. Under the nationwide GO ELK! research project, which focuses on small electric fleets operating in commercial and industrial settings, ISEA has been tasked with performing the accompanying research. The Diakonie social welfare station operated by the Johannesstift organization in Berlin was chosen because it meets the prerequisites in terms of intensity of use, with the vehicles slated for daily use over a period of 30 months.

IEEE German Chapter Meeting
The IEEE German Chapter Meeting of the joint IES/IAS/PELS German Chapter took place at ISEA and E.ON Energy Research Center in late March. More than 50 participants attended. During the large number of technical presentations centering on the topic “Power Electronics: Paving the Way for the Energiewende,” attendees gained an overview of the fields where ISEA has already contributed pioneering work in this general area, and about the potential that exists in energy distribution even with the technology available at present. External presentations from the companies SMA, Delta Systems and RWTH Aachen University spinoff AixControl completed the event.
Storage Systems I Testing center

A broad range of services

The testing center at the ISEA site on Hüttenstrasse offers ideal preconditions for testing electrical energy storage systems and equipment. Thanks to the specific lab infrastructure, project-related tests are performed in separate modular testing units. There are 24 lab units available here for cell, battery, and pack tests. This concept offers not only confidentiality for tests involved in different projects, but also a high level of security for employees.

The facility’s more than 600 testing channels, 170 temperature control units, and 110 impedance spectrometers enable extensive testing of all kinds. A vibration test bench serves for investigations of mechanical load capacity, and an abuse test bench is used to perform short circuit or overload tests that lie outside the specifications. A software system developed specifically for the requirements of this test bench enables not only central storage and preparation of measurement data, but also analysis and interpretation thereof as well as logging and tracking of all testing processes. This also ensures efficient processing from a labor and cost standpoint as well as traceable documentation. The testing facilities and equipment are regularly calibrated with a focus on data availability and reliability of testing. Automatic monitoring routines notify the appropriate employees in case of an emergency.

Battery testing for contract R&D work is performed by ISEA employees. Direct testing contracts, by contrast, are handled by P3 Energy & Storage. This corporate group holds ISO 9001 certification and can enter into “normal” B2B agreements, unlike the university. In addition, third parties can rent individual test benches – after appropriate training and instruction – and operate them on their own responsibility.

Electrical Drives I Conference report

ISEA drive group at PEMD conference in Manchester

ISEA was represented at this year’s International Conference on Power Electronics, Machines and Drives (PEMD) in Manchester, England, by four employees and six publications on current topics from the electrical drive group. The publications presented dealt with discrete thermal modeling of electrical machines, the influences of rotor eccentricities on switched reluctance motors (SRMs), and various considerations regarding acoustically favorable design and control of SRMs. An article on reduction of torque ripple in synchronous reluctance motors through the use of asymmetrical rotor structures was also presented.

The analysis of rotor eccentricity focused on changes in flux distribution in the SRM and the tangential and radial forces at the stator tooth. In the future, the influence of eccentricity on motor acoustics will also be analyzed. Furthermore, the process of designing high-speed switched reluctance motors for traction applications was presented, with a focus on acoustic behavior. The acoustic benefits of current hysteresis control compared to PWM-based control of the SRMs were presented in comparison form, and direct instantaneous force control (a control algorithm to prevent mode-zero oscillation in SRMs) was introduced as hysteretic power control.

The group’s participation in the conference unlocked insights into current research on drives, especially in the field of reluctance motors.

Short & Compact II

New covered bike racks at ISEA

After years of efforts – as many alumni will recall – the long-awaited covered bike racks were finally installed at the Jägerstrasse site over the last few weeks. The main and side entrances now feature sturdy, weather-protected places for ISEA researchers, students, and guests to park their bicycles. Those who had previously refrained from biking to ISEA for fear of damage to their bikes will now need to find a new excuse.

Field trip over the Pentecost holiday, 2014

This year’s ISEA student field trip was held in June. The five-day excursion first took the group to Lake Constance, where they visited Liebherr Aerospace and Liebherr Elektronik. After spending the night in Tübingen, the students went on to Mercedes-Benz, presented battery systems for electric vehicles. Thanks to the generous support provided by the companies hosting the group, the Pentecost holiday field trip was a great success again this year.
Storage Systems I Conferences and trade fair

Research and business meet at IRES

The ninth International Renewable Energy Storage Conference (IRES 2015) is scheduled to take place March 9–11, 2015. The conference, which will be held at the Düsseldorf site for the first time next year, has for many years been the largest and most important scientific conference that deals extensively with the various options available for storing energy in systems with high proportions of renewable energies. Over the course of the conference, all kinds of electrical, thermal, and chemical storage options are considered. Topics of presentation and discussion also include the need for storage and the overall economic and legal conditions that apply to various scenarios. The event is organized by EuroSolar, and the overall scientific leadership rests with Professor Dirk Uwe Sauer.

Although the deadline for abstracts has passed, abstracts can still be submitted for poster presentations (http://www.eurosolarde/en/index.php/ires-conference-series).

In 2015, the IRES conference will be held in cooperation and simultaneously with Energy Storage Europe (conference and trade fair) and the one-day 4th Conference Power-to-Gas (OTTI e.V.). There will also be an expo, a feature that already this year drew more than 60 companies and research institutions presenting products and solutions having to do with all aspects of the conference subjects. This means that there will be three conferences and one exposition meeting in the professional setting offered by the Düsseldorf trade fair grounds, a single location that is open to all conference attendees. This situation will create the world’s most important industry meeting point for the research and business sectors in the energy storage segment. IRES will remain the central conference for scientific dialogue and sharing of research, while ENERGY STORAGE will look at industrial and business aspects in particular.

Storage Systems I Conference

Advanced Battery Power

The annual Advanced Battery Power conference is scheduled to take place in Aachen once again on April 28 and 29, 2015. The event focuses on battery technology for mobile and stationary applications.

Advanced Battery Power has become a central meeting point for the research sector and industry in just a few years. Alongside personal contact, dialogue about the latest research, developments, and field experiences in the battery technology segment takes center stage during the event. All of the main aspects, from fundamentals and materials to cell and system design, are presented and discussed in a broad range of presentations and posters. Mobile applications in vehicles of all kinds are a major area of focus, as are battery systems both large and small. In 2015, micro-hybrid vehicles with lead starter batteries and other storage concepts will occupy a particular amount of space.

The call for papers will be open until October 17, 2014, offering a good opportunity to submit current R&D topics for the conference. For further information on the conference, see the appendix to this newsletter or visit http://www.battery-power.eu/en/home.html. The event is organized by Haus der Technik, in Essen. As in previous years, the scientific aspects of the conference are headed by Professor Martin Winter of the University of Münster and Professor Dirk Uwe Sauer.

Journal of Energy Storage debuts

Scientific publications in high-quality peer-reviewed journals are crucial to the development of a scientific discipline. Research on energy storage is highly interdisciplinary in nature and features a close connection with real-world applications. There is no one single best kind of energy storage; instead, the goal is always to find the optimum system solution for a specific application. Research and development activities in the energy storage field are therefore highly systemic.

Previously, there was no truly suitable academic journal for the discipline of energy storage devoted specifically to this set of topics. Now, publisher Elsevier is filling this gap by launching its Journal of Energy Storage. This scientific series with peer review will be devoted to all aspects of electrochemical, chemical, mechanical, electrical, and thermal energy storage. System and grid integration, modeling and analysis of the properties of different forms of energy storage, presentation of new storage technologies, design and management strategies are particular areas of focus, as are business models and operational experiences.

The goal is to bring together all of the key questions and findings having to do with storage of energy in this journal. Professor Dirk Uwe Sauer will handle the scientific management of the journals as its editor. Potential authors are cordially invited to submit high-quality articles for the first issue. Overview articles are also definitely welcome during the initial phase. To spur dialogue in the scientific and research community, the journal will also feature a discussion section where short comments and remarks on previously published articles can be published. The full aims and scopes of the journal are laid out in the appendix to this newsletter.

Power Electronics Storage Systems Electrical Drives
Storage Systems | Toolbox

Design of high-voltage battery storage systems using thermal and electrical simulation

As part of the “Toolbox Speichersysteme” (Storage System Toolbox) project funded by the state of North Rhine-Westphalia, ISEA is working with a company called dSpace to develop a simulation framework for design and real-time simulation of complex high-voltage battery storage systems.

The framework being developed can be used to simulate all kinds of thermal and electrical configurations. Changes in pack geometry as well as cooling performance and cooling systems with various load profiles are being studied, with direct feedback from cell temperatures on the cells’ electrical behavior being of particular interest. In conjunction with holistic aging models, the researchers will also be able to make forecasts regarding aging. Thanks to the extensive testing infrastructure and comprehensive experience, both thermal and electrical parameters for the cells will be determined at ISEA based on proven methods.

This illustration shows the thermal and electrical simulation of a battery pack consisting of 50 pouch cells. The thermal gradient shown arises after 1,000 s at a discharge level of 15 A per cell. Heat is discharged via cooling fins between the cells and two cooling channels.

Lost heat and voltage curves on the simulated cells are determined using a complex impedance-based model. This model, which encompasses seven elements per cell and was parameterized using electrochemical impedance spectroscopy at various operating points, simulates the distribution of heat within the pack under different conditions. In this case, the storage system consists of two parallel banks with five submodules each, switched in series. These submodules in turn encompass five parallel cells.

Storage Systems | Research projects

Energy management in electric vehicles

Using energy efficiently is especially important in electric vehicles. The battery – as the central component – and the system controlling energy consumption have a crucial influence on the range and cost of an electric car. The energy storage systems do not merely provide the required drive performance, they also have to perform numerous other supply functions. In particular, the energy needed for air conditioning and electrification of other vehicle components necessarily lead to increasingly stringent requirements. In this situation, the goal is to develop intelligent energy management systems in order to use the batteries optimally. ISEA is currently engaged in multiple research projects, studying energy management systems for different tasks.

The most important vehicle components, such as the battery, power electronics, and engine, have to be supplied with energy along with the air conditioning system and numerous secondary electrical consumers and their control systems.

If energy grows short, secondary energy-using components that do not affect safety, such as the air conditioning, can be switched off, or drive power can be limited in order to reach the destination safely. Energy storage systems also need to be used optimally based on the information supplied by the battery management system, thereby extending their life span and consequently reducing costs.

The INGENEV project funded by the state of North Rhine-Westphalia is dealing with the complex task of whole-vehicle energy management. In the DriveBattery2015 project, which is supported by the German Federal Ministry for Economic Affairs and Energy (BMWI), the focus is on developing a form of energy management for optimum use of different battery packs in vehicles. This modular approach not only reduces costs, but also extends the field of applications and boosts flexibility of the energy supply system.
Events/Dates

November 5, 2014, 6.00 p.m.
Reiff-Museum, 52062 Aachen
Schinkelstrasse 1/Templergraben 51, Room R5

ISEA Colloquium: Open Innovation
Prof. Dr. rer. pol. Frank Thomas Piller
Chair of Business Operations TIM (Technology and Innovation Management)
RWTH Aachen University

December 10, 2014, 6.00 p.m.
Reiff-Museum, 52062 Aachen
Schinkelstrasse 1/Templergraben 51, Room R5

ISEA Colloquium
Dr.-Ing. Jürgen Reinert
Chairman of Technical Development SMA Solar Technology AG

Dissertations

Matthias Bösing:
Acoustic Modeling of Electrical Drives

On September 12, 2013, Matthias Bösing passed the doctoral examination on his dissertation Acoustic Modeling of Electrical Drives.

In his work, Bösing presents a universal method of modeling the acoustic behavior of electric drives. The goal is to improve the quality of acoustic modeling of electric drives while simplifying their use and making them accessible to a broad group of users.

The process presented in the dissertation enables comprehensive, true-to-life modeling of electromagnetic noise excitation on a routine basis as part of the design of electric drive systems.

The method is based on a system simulation and vibration synthesis approach. The vibration synthesis process is suitable for all machine types and geometric configurations, including skewed, transversal-flux and outer-rotor machines. Machine and air-gap force models are developed for permanent magnet synchronous machines and switched reluctance machines and embedded in the system simulation. The method is illustrated and verified via application examples from electrical traction and industrial applications.

Dr. Matthias Bösing has worked for Robert Bosch GmbH in the development of power electronics for the electric traction segment since 2012. Before that, he was a research assistant at ISEA.

The dissertation has been published by Shaker Verlag as volume 71 of Aachener Beiträge des ISEA and is available under ISBN 978-3-8440-2752-5.

Recent Publications

T. Baumhöfer, M. Brühl, S. Rothgang, D. U. Sauer
Production caused variation in capacity aging trend and correlation to initial cell performance,
J. Power Sources, 247 (2014) 332-338

A review of current automotive battery technology and future prospects,
J. Automobile Engineering, 227 (2013) 761-776
Optimal allocation and capacity of energy storage systems in a future european power system with 100% renewable energy generation, Energy Procedia, 46 (2014) 40-47

Elektrischer Antriebsstrang, erschienen in „Elektromobilität – Grundlagen einer Zukunftstechnologie“, Springer-Verlag, 3/2013

C. Fleischer, W. Waag, H. M. Heyn, D. U. Sauer  

H. v. Hoek, T. Lange, M. Bösing, D. v. Treek, R. W. De Doncker  
Hochvoltarchitektur, erschienen in „Forschungsprojekt e performance“, Cuvillier-Verlag, 1/2014

H. v. Hoek, M. Neubert, R. W. De Doncker  

S. Käbitz, J. B. Gerschler, M. Ecker, Y. Yurdagel, B. Emmermacher, D. André et al.  
Cycle and calendar life study of a graphite LiNi_{1/3}Mn_{1/3}Co_{1/3}O_{2} li-ion high energy system, Part A: Full cell characterization, J. Power Sources, 239 (2013) 572-583

T. Lange, H. v. Hoek, C. Schaeper, R. W. De Doncker  
Advanced modular drive train concepts for electric vehicles, erschienen in „Advanced Microsystems for Automotive Applications 2013“, Springer-Verlag, 6/2013

Leistungselektronik, erschienen in „Forschungsprojekt e performance“, Cuvillier-Verlag, 1/2014

Automatic device for continuous measurement of potential distribution and acid stratification in flooded lead-acid batteries, J. Power Sources, 221 (2013) 116-121

W. Waag, D. U. Sauer  

Patents


S. Engel, R. W. De Doncker  

Compact cable suspended pumping system for dewatering gas wells [EN], US 8584761, 28.02.2013
Thinking the Future.

**Full Professor (W2)**
in **Ageing Processes and Lifetime Prediction of Batteries**
Faculty of Electrical Engineering and Information Technology

We are seeking qualified applicants for teaching and research in the area of experimental analysis of ageing processes and lifetime prediction for batteries. The starting date is Sommer semester 2015 or later. Recognized expertise in the following areas is particularly welcome:

- lifetime prediction under different operating conditions for developers of battery materials as well as for applicants
- post-mortem analysis for parameterizing physico-chemical models of ageing processes in any type of batteries

The professorship is part of the Helmholtz-Institute "Ionics in Energy Storage", founded by Forschungszentrum Jülich GmbH, University of Münster and RWTH Aachen University.

A Ph.D. degree is required; additionally, Habilitation (post-doctoral lecturing qualification), an exemplary record of research achievement as an assistant / an associate / a junior professor or university researcher and/or an outstanding career outside academia are highly desirable. Ability in and commitment to teaching are essential. German is not necessary to begin but will be expected as a teaching language within the first 5 years. Proven ability for carrying out scientific research projects, successful applying for third party funding, and a strong inclination to interdisciplinary cooperation are expected. Scientific experience should be demonstrated in experimental electro chemistry with a focus on ageing processes in batteries. The professor should have very good didactic skills.

Organizational integration is with the Institute for Energy and Climate Research (IEK) at FZ Jülich and infrastructure will be provided by the chair for Electrochemical Energy Conversion and Storage Systems at RWTH Aachen University (location of work).

The application should include supporting documents regarding success in teaching.

Please send a cover letter stating research aims and a CV to: An den Dekan der Fakultät Elektrotechnik und Informationstechnik der RWTH Aachen, Hern Prof. W. Mokwa, 52056 Aachen, Germany. The deadline for applications is October, 15th 2014.

This position is also available as part-time employment per request. RWTH Aachen University is certified as a family-friendly university and offers a dual career program for partner hiring. We particularly welcome and encourage applications from women, disabled people and ethnic minority groups, recognizing they are underrepresented across RWTH Aachen University. The principles of fair and open competition apply and appointments will be made on merit.
Aims and Scope

The *Journal of Energy Storage* focusses on all aspects of energy storage, in particular systems integration, electric grid integration, modelling and analysis, novel energy storage technologies, sizing and management strategies, business models for operation of storage systems and energy storage developments worldwide.

The journal offers a single, peer-reviewed, multi-disciplinary platform for scientists and engineers in academia, research institutions, government agencies and industry. The journal is also of interest to decision makers and technical, economic and policy advisers in these organisations.

The *Journal of Energy Storage* welcomes original research papers, reviews and short communications. Topics include, but are not limited to the following:

- Science, technology and applications of electro-chemical, chemical, mechanical, electrical and thermal energy storage
- Engineering, control, optimization, numerical and modelling aspects of energy storage systems
- Demand and management of intermittency in large scale low-carbon power generation involving renewable energy sources using energy storage systems and other competing flexibility options such as flexible power plants, demand side management in households and industry, combined heat and power, or grid extensions
- Applications, load profiles and requirements of storage technologies in grid-scale electrical storage, electric vehicle transportation, traction applications, off-grid systems, uninterruptible power supplies, and portable electronic applications
- Management and control of large quantities of distributed storage systems as virtual large scale storage systems, including vehicle-to-grid, energy storage integrated with buildings, and multi-purpose and hybrid storage systems
- Testing, test procedures, evaluation, lessons learned, life cycle costs, life cycle assessment, and safety of energy storage systems
- Economic, policy and regulatory aspects, markets, market models, and market introduction concepts of energy storage systems.

Editor: Dr. Dirk Uwe Sauer
Contact: journal_of_energy_storage@isea.rwth-aachen.de
With the “Energiewende” (Energy Transition) towards more renewable and distributed generation in the power system ongoing, the 6th International Symposium on Power Electronics for Distributed Generation Systems (PEDG2015) will be held from the 22nd – 25th June 2015 in Aachen, Germany. The venue is easily accessible by air via Frankfurt, Düsseldorf, Cologne and Brussels and connecting high-speed trains to Aachen.

This international symposium, sponsored by the IEEE Power Electronics Society and organized by the PELS Technical Committee on Sustainable Energy Systems, will provide a venue for experts to present the state-of-the-art in power electronics and distributed generation (DG) systems. The symposium will feature keynote speeches, tutorials and regular technical sessions on theory, analysis, design, testing and deployment related to power electronics for distributed generation and renewable energy systems. ALL PAPERS IN PEDG2015 WILL APPEAR IN IEEE XPLRE AND WILL BE LISTED IN THE EI COMPENDEX. THERE WILL BE THREE BEST PAPER AWARDS AS SELECTED FROM THE FULL PAPER SUBMISSIONS.

SUBMISSION OF PAPERS

Prospective participants are invited to electronically submit an extended abstract of their work. The document should be in English, and should be single-column double-spaced and not exceed 5 pages. The abstracts will be subject to a peer-review process. Detailed submission instructions and symposium information will be posted on the symposium website. Technical papers are sought on the following topics:

Track 1: Power Electronics in Distribution Systems
- Wind farms, PV farms, wave energy systems, co-generation
- Ac vs. dc distribution, smartgrid, micro/nano-grid
- Power devices, inverters, power quality, control
- Highly efficient power conversion for DG and renewable power systems

Track 2: Power Electronics for Sustainable Sources
- PV, wind, CHP, wave, fuel cells, others
- Power components, dc-dc & dc-ac converters
- Control, communication and monitoring of renewable energy systems

Track 3: Power Electronics for Energy Storage systems (stationary and mobile)
- Batteries, ultracapacitors, fuel cells, hybrid storage
- Bidirectional dc-dc converters, charge controllers
- Plug-in hybrid electric vehicle applications

LOCATION

Aachen is situated directly on the border with Belgium and the Netherlands. It is Germany’s most westerly city, with a population of nearly 260,000. Approximately 41,000 students (57% engineering students) attend RWTH Aachen University. The tutorials will be organized at the new RWTH CAMPUS, with opportunity to visit the laboratory of E.ON Energy Research Center and Center for Wind Power Drives.

LANGUAGE

The working language of the conference will be English.

SOCIAL PROGRAM

A social program will be provided for participants and accompanying persons as an opportunity to get better acquainted with Aachen City and historic sites in the near vicinity. A full program of daytime activities is in planning for accompanying persons.

DEADLINES

Extended abstract submission : 31st January 2015
Notification of acceptance : 4th April 2015
Final manuscripts : 9th May 2015
CALL FOR PAPERS
(Deadline: October 17th, 2014)

Technical Conference with Simultaneous Translation

Electric & Electronic Systems in Hybrid and Electric Vehicles and Electrical Energy Management

April 22nd - 23rd, 2015, in Bad Boll

Advisory Committee
Dr.-Ing. Dirk Balzer, Opel AG; Prof. Dr.-Ing. Ludwig Brabetz, University of Kassel; Prof. Dr.-Ing. Stephan Frei, Technical University Dortmund; Dipl.-Ing. Friedrich Graf, Continental; Prof. Dr.-Ing. Hans-Georg Herzog, Technical University Munich; Dr. Vera Lauer, Daimler AG; Dr. Jan Lichtermann, Robert Bosch GmbH; Dr.-Ing. Marc Nalbach, Hella KGaA Hueck &Co.;"Dr.-Ing. Dieter Polenov, BMW Brilliance Automotive Ltd.; Dr. Hartmut Pröbstle, BMW Group; Dr.-Ing. Tomas Reiter, Infineon Technologies AG; Prof. Dr. Dirk Uwe Sauer, RWTH Aachen; Dipl.-Ing. Peter Schmitz, Ford Forschungszentrum Aachen GmbH; Richard Schöttle, Robert Bosch GmbH

Submission of Papers or Posters: October 17th, 2014
- Headline and Abstract (in English or German, 10 – 20 lines)
- Author(s): degree, last name, first name, address, telephone, fax and e-mail address!
Please upload your paper on the Website www.eehe.de!
Topics

- Components, systems and architectures and design tools for Micro up to Full Hybrid, Plug-in-Hybrid and Electric Vehicles
- Electrified powertrain systems, semiconductors for Hybrid and Electric Vehicle applications
- 12/48V power supply system architectures and 48V components
- Multiple voltage power supply (12V/24V/48V/HV)
- Electrical energy management
- Battery management & low voltage accumulators
- Electric charging
- Power electronics
- Special applications for heavy duty vehicles
- Development tools and methods
- Power supply systems for highly automated or autonomous drive

Every contribution is scheduled with 20 minutes for the presentation and 10 minutes for questions and discussion. The conference language is German or English, simultaneous translation will be available. Additionally, posters will be presented in a Poster Exhibition. Some of them may be selected for a 5 min presentation in the auditorium.

Further Milestones

Confirmation to the authors: December 12th, 2014
Deadline for the final papers (presentation, poster): April, 10th, 2015

Chairmen

Dipl.-Ing (Univ.) Ottmar Sirch, BMW Group, Electrics/Electronics, Vehicle Power Supply and Electrification, D-80788 München, Knorrstr. 147, Phone: +49 (0) 89 / 382-39523, e-Mail: ottmar.sirch@bmw.de

Dr.-Ing. Carsten Hoff, Hella KGaA Hueck&Co., Product Segment Energy Management, D-59552 Lippstadt, Beckumer Str. 130, Phone: +49 (0) 2941-38-2845, e-Mail: carsten.hoff@hella.com

Contact Office

Haus der Technik e.V., Ms. Susanne Kernebeck, Hollestraße 1, D-45127 Essen, Phone: +49 (0) 201 / 1803-262, Fax: +49 (0) 201 / 1803-263, E-Mail: s.kernebeck@hdt-essen.de

Website for Abstract Submission

www.eehe.de

Recap EEHE 2014

In May, 2014, 200 experts discussed the implementation of alternative engine concepts in motor vehicles. The introduction of the Porsche 918 Spyder raised the bar even higher. Leading OEMs and suppliers then concentrated on detailed solutions in the areas of electrics/electronics for hybrid, plug-in-hybrid and electric vehicles, electric charging, management of electric energy, performance electronics, low voltage accumulators and battery management for electric energy storage, market development, highly automated driving and development models. International interest in the conference has risen further. Intensive discussions took place in both of the parallel meetings right up until the end.
Call For Papers

Advanced Battery Power
Kraftwerk Batterie

Date: April 28-29, 2015
Location: Aachen, Germany

The Advanced Battery Power Symposium 2015 will take place in Aachen, Germany. As in previous years, scientists, developers and engineers from across the entire battery value chain are again expected to attend the 7th International Symposium “Advanced Battery Power – Automotive and Energy Supply Solutions”. The most advanced first-hand and cross-industry information on all aspects of battery development and applications are both the mandate and the appeal of the Advanced Battery Power Symposium and Battery Day NRW before it.

There will be additional exhibition facilities for companies. The symposium will be organized in conjunction with the Battery Day NRW, a presentation of battery-related research and industry activities in the German federal state of North-Rhine Westfalia one day before the Haus der Technik Symposium.

CONFERENCE CHAIRS

Prof. Dr. Dirk Uwe Sauer, ISEA - Institut für Stromrichtertechnik und Elektrische Antriebe, RWTH Aachen
Prof. Dr. Martin Winter, MEET - Münster Electrochemical Energy Technology, WWU Münster

www.battery-power.eu
Call For Papers for Lectures and Posters

We invite you to share your recent scientific results, research projects, as well as industrial developments and strategies, either in oral or poster presentations, during our Symposium. Conference language is English.

TOPICS

1. Lithium ion cells: materials and improvements on properties
   - Anodes, cathodes, electrolytes, separators, active and passive electrode components
   - Advancements of power and energy density
   - Advancements in cost reductions
   - Cell concepts and performance
   - Calendar life & cycle life
   - Improved safety on material and cell level
   - Theory, fundamentals and microscopic models

2. Battery systems
   - Battery modeling (electrical, thermal, ageing, lifetime prediction)
   - Battery diagnostics (SOC, aging, performance, etc.)
   - Battery management (cell balancing, charge management, thermal management, etc.)
   - Test procedures and results from field tests and laboratory tests on lifetime, performance and safety
   - Reliability of different battery pack designs

3. Beyond and beside lithium-ion technology
   - Lithium air / lithium sulphur / lithium metal batteries
   - Non-lithium technologies (sodium, magnesium, zinc, redox flow)
   - Progress on other battery technologies (any technology potentially suited for automotive or stationary applications)
   - Supercaps (incl. hybrids)

4. Production of battery systems and cells
   - Machinery and devices for battery and cell manufacturing
   - Production process design
   - Optimized battery pack and cell designs for efficient production
   - Recycling of resources and of all relevant battery materials
   - Scenarios for battery costs, production capacities, and markets

5. Stationary battery systems
   - Application of stationary storage (any technology) for grid stabilization, self-consumption from PV system, UPS, power supply for fast charging, teaming-up several services to one system, etc.
   - Field experience, lifetime issues, optimized operation strategies, sizing tools, etc.
   - Hardware challenges beyond batteries (power electronics, safety, BMS hardware, etc.)
   - PHEV and EV as grid elements (technical, lifetime and economic aspects, energy management, smart grids, self-consumption, etc.)

6. Automotive and mobile applications
   - 14V/48V vehicle power supply systems (topologies, technologies, combined battery systems, management strategies, etc.)
   - Lead acid and alternative battery technologies for low volt automotive applications
   - Electro mobility: from hybrid to battery electric vehicles (field experience, vehicle concepts, battery requirements, etc.)
   - Heavy-duty, public transport, and off-road applications

Between the lecture sessions, sufficient time will be provided for poster sessions and for informal communication between symposium attendees. Members of universities and students will be granted significant discounts on conference fees.

Deadline: October 31th, 2014

Please send your abstract at latest by October 31th, 2014 via upload on www.battery-power.eu
Conference language is English.

ORGANIZATION
Bernd Hömberg, Haus der Technik, Essen, Germany, +49 201 1803-249, b.hoemberg@hdt-essen.de

www.battery-power.eu
Call for abstracts

9th International Renewable Energy Storage Conference (IRES 2015)
Messe Düsseldorf, March 9-11, 2015

The series of IRES conferences has emerged as the leading forum for the discussion of the pressing problems with renewable energy storage by drawing together one of the largest gatherings of scientific and economic experts worldwide.

Now the participants can choose from even more extensive options. Running in Düsseldorf for the first time, IRES 2015 is being held as a concurrent event with ENERGY STORAGE EUROPE (Conference & Expo) and the 4th Conference Power-to-Gas Conference (OTTI e.V.). Furthermore, there will be a tradeshow with approx. 80 exhibitors.

The three conferences and the exhibition will take place March 9 - 11, 2015 in the professional surroundings of Messe Düsseldorf (Trade Fair Dusseldorf), Germany. Combining their events, the organizers, thereby, will be establishing the most important Energy Storage meeting worldwide.

Day one of the conference is being jointly organized and will be offering an excellent overview of all relevant topics. Days two and three are being separately organized by either partner. The IRES symposium continues to be the meeting to present scientific results. Particularly the interfaces between the different energy sectors (electricity, heat, gas, mobility) will be thoroughly analyzed. The conference program will include presentations and lectures from around the world, selected by an international scientific steering committee from the papers submitted for consideration during this Call for Abstracts.

Selected full papers will be published on the Elsevier online platform Energy Procedia and in the EUROSOlar quarterly “Solarzeitalter” and, thereby, will achieve high visibility. The best papers will be considered for publication in the new peer-reviewed Elsevier journal „Journal of Energy Storage“ to be launched in 2015. The IRES conference is further developing its presentation of the scientific state of the art and will present a well founded and comprehensive platform for the presentation of your findings.

All partners are very pleased with the new format. More than 1,000 expected attendees will have the opportunity to present themselves, access information and broaden personal networks.

We invite you to submit your entry for the Call for Abstracts at IRES 2015.

The conference will be held in English language.
Summary of important dates:

September 1, 2014 – Deadline for submission of abstracts
October 30, 2014 – End of cursory review (abstracts)
February 1, 2015 – Deadline for submission of full papers

Abstracts of papers and presentations:

You are invited to submit abstracts of projects addressing the following topics:

TECHNOLOGIES, SYSTEMS, PLANTS & SCENARIOS

- Storage technology for electrical energy, heat, mobility and gas (electrochemical, electrostatic, electromechanical, electro-dynamic, chemical, thermal and thermo-chemical)
- The need for storage capacity: scenarios and assessment studies for all applications and energy sectors
- Strategies for systems with a high share of Renewable Energy and 100% Renewable Energy systems – focus on the use of storage
- Connecting electric-drive vehicles and the electric grid (vehicle to grid)
- Smart grid concepts and hybrid and combined Renewable Energy power plants/virtual power plants with Renewable Energy
- Heat storage for buildings and industrial applications
- Compact thermal energy storage: design of reactors, heat exchanger development, optimization of heat and mass transport as well as simulations of all these aspects
- High temperature storage for Concentrating Solar Power (CSP) technologies
- Products, management strategies and field experience with storage systems to increase self-consumption of photovoltaic energy from owned facilities as well as off-grid and micro-grid systems

NETWORKS

- Electric grids and storage – supplements and competition
- Distributed and decentralized electricity storage as virtual large-scale storage facility
- CHP and heating networks, use of new or existing thermal storage in the power grids
• High temperature storage for solar thermal power plants (CSP) or compressed air energy storage

• Interaction of the energy networks for power, gas and heat

• Cross-sector use of energy storage systems: Power-to-Gas, Power-to-Heat, Power-to-Mobility, Power-to-Chemicals, Power-to-Liquid

POLITICS, POLICIES, LAW AND MARKET

• The legal, political, social, national economic and market economic aspects of integrating energy storage into the energy supply system

• Market entry strategies and the associated business and cost models for the operation of storage systems and hybrid and combined Renewable Energy power plants/virtual power plants under different economic and technological frameworks (developed countries, developing countries, emerging economies)

• And in particular: realized systems and operational experience

• All topics can be considered from a technical, an economic as well as from an ecological point of view.

Presentations of oral format or poster exhibition:

Submissions will be presented as oral or poster presentations. Oral presentations will be grouped into thematically related areas. For poster presenters, A0 size poster walls will be available. As part of the conference, posters will be presented in prime space where the attendees can view them also during breaks. Furthermore, additional time slots where no parallel presentations or lectures are taking place will be reserved for discussion and presentation of the posters.

Submission of abstracts:

Please click here to sign up for our abstract management system and to upload the abstract of your paper or poster concept.

Form requirements for abstracts submissions

• Language: English
• 300 words maximum
• Two optional pages maximum, including charts or diagrams with captions and explanatory remarks
• Font: Times New Roman, 12 pt, title in capital letters
• Line spacing 1.15
• Only PDF files
• Structure: intro, methodology, results, discussion, conclusion
Assessment of abstracts:

When the deadline for submissions has past, the abstracts will be evaluated in terms of content, form, and suitability for the event by the steering committee. Submission of an abstract does not guarantee acceptance. The steering committee is fully authorized to reject submissions. The decision by the Steering Committee is final.

Your participation:

Speakers and poster exhibitors whose abstracts for IRES 2015 have been accepted participate in discounted registration for the IRES: € 350

Please note:

Your submission applies to IRES 2015 only.