

Energy Working Group Arbeitskreis Energie (AKE)

Hardo Bruhns
Meliesallee 5
40597 Düsseldorf
ake@bruhns.info

The programme of the Energy Working Group comprises sessions which deal with energy technologies based on geological, biological, chemical and physical research in conjunction with engineering developments. A major part is devoted to renewable energies. Novel developments are presented both for silicon based photovoltaics and new classes of organic, colloidal nanocrystal and hybrid semiconductors, perovskite type materials in particular. In this context also the plenary talk on Friday should be noted. - For concentrating solar thermal power routes towards cost and concept optimizations are analyzed. - The discussion of geothermal energy focuses on deep fluid reservoir technology and the physico-chemistry for optimized utilization of the hot saline fluids. - Energy from biomass has an important role. In the long term novel concepts of designing a biological metabolism for enhancing direct hydrogen production at the expense of biomass production could open very substantial new options. - The energy challenge can be reduced by energy savings which is a wide topic. Here progress is presented in developing energy efficient building envelopes.

The internationally unbroken trend of dominant fossil fuel use progressively implies unconventional fossil fuel extraction. As a consequence, however, also options for carbon capture and geological storage must receive due attention. - Forecasts see fission power as a provider of at least a constant fraction of the world electricity supply over the forthcoming decades, these technologies continue therefore to be of high significance. - Fusion energy is the only known further clean option for non-fossil electricity generation. Systematically different from the other energy sources it could offer a large potential of non-fluctuating electricity generation if research will be successful. Both magnetic and inertial confinement fusion research are being addressed.

A substantial part of the programme is devoted to various aspects of energy storage which is a crucial prerequisite both for electromobile applications (ex. Li-Ion batteries) and for large-scale fluctuating grid electricity (ex. Power-to-Gas). Mitigating and managing the fluctuating nature of electricity generation dominantly from wind and photovoltaics is the dominant challenge. After assessing the corresponding implications on a European-wide statistical basis and with regard to the impacts on conventional technology, there are joint sessions regarding analysis and modeling of fluctuating generation and consequent backup and storage requirements as well as the requirements for the electricity (smart) grid and consumer integration. A further joint sessions extends into the area of sustainability and human nature interaction. - Last but not least, the integral assessment of electricity generation systems, incorporating external cost, is discussed with a view to identifying and optimizing instruments for energy policy.

Submitted talks complement the invited talks. The sequence of sessions reflects to some extent the agenda of speakers and the boundary conditions for designing the joint sessions.

Overview of Invited Talks and Sessions

(Lecture room: A 151)

Invited Talks

AKE 1.1	Mon	9:30–10:00	A 151	Perspectives and challenges of thin-film crystalline silicon solar cells on glass — ●BERND RECH, DANIEL AMKREUTZ, JAN HASCHKE, STEFAN GALL, CHRISTIANE BECKER, ONNO GABRIEL, RUTGER SCHLATMANN
AKE 1.3	Mon	10:15–10:45	A 151	Neue optoelektronische Materialien und Verfahren für die Photovoltaik — ●CHRISTOPH BRABEC
AKE 2.1	Mon	11:30–12:00	A 151	Konzepte zur Kostensenkung solarthermischer Kraftwerke — ●ROBERT PITZ-PAAL
AKE 3.1	Mon	12:00–12:30	A 151	Deep geothermal fluid resources: Energetic use and beyond — ●HARALD MILSCH

AKE 4.1	Mon	15:00–15:30	A 151	Nuclear fission energy: new build, operation, fuel cycle and decommissioning in the international perspective — ●STEFAN NIESSEN
AKE 5.1	Mon	15:30–16:00	A 151	Wendelstein 7-X , ein Konzept für ein stationäres Fusionsplasma — ●ROBERT WOLF, W7-X TEAM
AKE 5.2	Mon	16:00–16:30	A 151	Laserfusion: status and concepts for new laser drivers and ignition physics — ●BJORN MANUEL HEGELICH
AKE 6.1	Mon	16:45–17:15	A 151	”Fracking”- Routine oder Risikotechnologie? — ●MICHAEL KOSINOWSKI
AKE 6.2	Mon	17:15–17:45	A 151	Geological carbon storage: processes, risks and opportunities — ●HOLGER OTT
AKE 7.1	Tue	9:30–10:00	A 151	Optionen und Trends der Biomassenutzung: Perspektiven für die Bioenergie 2050 — ●JENS PONITKA, DANIELA THRÄN
AKE 7.2	Tue	10:00–10:30	A 151	Rational design of cyanobacteria for hydrogen production — ●SASCHA REXROTH
AKE 8.1	Tue	10:45–11:15	A 151	Energiespeicher für die Elektromobilität - Perspektiven und Limitierungen — ●MARGRET WOHLFAHRT-MEHRENS
AKE 9.1	Tue	14:00–14:30	A 151	Power to Gas - an economic approach ? — ●MANFRED Waidhas
AKE 10.1	Wed	9:30–10:00	A 151	Neue Materialien und Komponenten für Energieeffiziente Gebäudehüllen — ●ULRICH HEINEMANN, HELMUT WEINLÄDER, HANS-PETER EBERT, STEPHAN WEISMANN
AKE 11.1	Wed	10:15–10:45	A 151	Ganzheitliche Bewertung von Stromerzeugungssystemen — ●RAINER FRIEDRICH, MARKUS BLESL
AKE 12.1	Wed	11:15–11:45	A 151	Electricity by Intermittent Sources — ●FRIEDRICH WAGNER
AKE 13.1	Wed	15:00–15:30	A 151	Fluctuations from photovoltaic and wind power systems — ●DETLEV HEINEMANN, GERALD LOHMANN, MOHAMMED REZA RAHIMI TABAR, MEHRNAZ ANVARI

Sessions

AKE 1.1–1.4	Mon	9:30–11:00	A 151	Photovoltaics
AKE 2.1–2.1	Mon	11:30–12:00	A 151	Solarthermal Energy Systems
AKE 3.1–3.1	Mon	12:00–12:30	A 151	Geothermal Energy
AKE 4.1–4.1	Mon	15:00–15:30	A 151	Nuclear Fission Energy
AKE 5.1–5.2	Mon	15:30–16:30	A 151	Nuclear Fusion Research
AKE 6.1–6.2	Mon	16:45–17:45	A 151	Fossile Energy Systems
AKE 7.1–7.2	Tue	9:30–10:30	A 151	Bioenergy
AKE 8.1–8.6	Tue	10:45–12:30	A 151	Energy Storage I, Mobility, Materials
AKE 9.1–9.4	Tue	14:00–15:15	A 151	Energy Storage II
AKE 10.1–10.2	Wed	9:30–10:15	A 151	Energy efficient Building envelopes
AKE 11.1–11.1	Wed	10:15–10:45	A 151	Integral Assessment of Electricity Generation Systems
AKE 12.1–12.3	Wed	11:15–12:15	A 151	Implications of Fluctuating Electricity Generation
AKE 13.1–13.5	Wed	15:00–16:30	A 151	Fluctuating Electricity Supply: Modelling of Generation, Backup and Storage (joint Session AKE / DY / SOE)
AKE 14.1–14.6	Wed	16:45–18:30	MA 001	Physics of Sustainability and Human-Nature Interactions I (joint with DY, jDPG, BP, AKE) - session accompanying the symposium SYPS
AKE 15.1–15.12	Thu	9:30–12:45	BH-N 243	Energy Systems (joint session DY/ AKE /SOE)

Annual General Meeting of the Energy Working Group

The annual general meeting of the energy group will take place during the AKE spring meeting in the Physikzentrum at Bad Honnef on 16 April 2015.