

Working Group on Energy Arbeitskreis Energie (AKE)

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This year's programme of the Energy Working Group (Arbeitskreis Energie, AKE) comprises 13 sessions which deal with energy technologies based on geological, biological, chemical and physical research in conjunction with engineering developments. Two of these sessions, arranged by the AKE, are joint sessions with the CPP and UP divisions, respectively. Furthermore, the Robert-Wichard-Pohl prize talk by C. Buchal (Tuesday) and the plenary talk by R. Schlögl (Friday) are associated to the programme. The sequence of sessions is imposed to some extent by constraints in the availability of the speakers and in designing joint sessions.

The major motivation for the international energy turn, recently discussed at the COP21 in Paris, is the climate change. Two talks are devoted to this topic as well as the impact of wind electricity production on the environment and local climate (AKE 13, jointly with UP) which becomes an issue with the massive deployment of wind turbines triggered by the „Energiewende“.

A number of talks are related to the German „Energiewende“ and its international siblings. General innovation aspects are discussed (AKE 3) as well as the question whether the impact on economy politically has ever been a sufficient optimizing parameter when from the outset almost the entire bill has been charged not to federal and state budgets but to the accounts of electricity consumers (AKE 5).

Regarding electricity generation, novel high-efficiency photovoltaic approaches are discussed (AKE 9, jointly with CPP), as well as the challenge of mitigating and managing the grid with the forthcoming dominating fluctuating electricity generation by wind turbines and photovoltaics and optimizing the deployment of the different generating technologies (AKE 10, comprising also climatologic modelling). A particularly relevant and difficult area is electricity storage (AKE 6 and Plenary Talk by R. Schlögl) for providing back-up generation and absorbing excess electricity production. According to present political plans the latter will be of same order or even larger than directly useful electricity production. Therefore system studies how to use excess electricity production, e.g. for a hydrogen economy, are highly relevant (AKE 7).

It would be worthwhile to foster R&D and deployment of non-fluctuating sources such as geothermal electricity (and heat). An interesting feature is the combination of this technology with CO₂ sequestration (AKE 1), in particular since internationally the trend of massive fossil fuel use is unbroken. Also electro-reduction of CO₂ by using excess electricity generation has come into focus (AKE 8).

Combined heat and power is strongly fostered by German politics via economic support measures, although electric heat pumps show superior performance in many situations and are the obvious corollary to future dominant renewable electricity production (AKE 2). Thermal power plants and other energy converters produce large amounts of waste heat. Thermoelectric materials, though R&D is still at laboratory assessment, offer options for reducing the anenergetic part of this waste heat (AKE 12).

Electricity, the most discussed energy vector, currently accounts only for one fifth of the German end energy use. One third is related to fuel in the transport sector. Options for novel biofuel production are discussed (AKE 1) as well as industrial strategies for future mobility (AKE 4).

International forecasts assume fission power as a provider of at least a constant fraction of the future (strongly growing) world electricity supply. Five years after the Tsunami on March 11, 2011, destroying the Fukushima reactors and thereby provoking an accident of the most severe nature according to the INES scale, it is worthwhile to assess with meanwhile much improved knowledge and understanding the causes and sequence of the events in the accident and its consequences, including, in particular, also the radiological impact on society (AKE 11).

Overview of Invited Talks and Sessions

(Lecture room H3)

Invited Talks

AKE 1.1	Mon	9:30–10:00	H3	Processes for Advanced Fuel Production from Biomass — ●JÖRG SAUER
AKE 1.2	Mon	10:00–10:30	H3	Combined CO ₂ -storage and geothermal energy extraction: potential and options — ●MARTIN O. SAAR
AKE 2.1	Mon	10:30–11:00	H3	Wärmepumpe oder KWK - was passt zur Wärmewende — ●GERHARD LUTHER
AKE 3.1	Mon	11:30–12:00	H3	Trends und Innovationen im Energiesektor — ●KLAUS WILLNOW
AKE 4.1	Mon	12:00–12:30	H3	Antriebs- und Kraftstoffstrategien für die zukünftige Mobilität — ●STEFAN SCHMERBECK
AKE 5.1	Mon	15:00–15:30	H3	Die Defizite der Energiewende — ●MANUEL FRONDEL
AKE 6.1	Mon	15:30–16:00	H3	Perspektiven und Limitierungen (elektro-)chemischer Energiespeicher – von der Batterie bis zu Power-to-X — ●RÜDIGER-A. EICHEL
AKE 7.1	Mon	16:00–16:30	H3	Methodische Aspekte der Systemanalyse zur Energiewende — ●DETLEF STOLTEN, MARTIN ROBINIUS, THOMAS GRUBE, SEBASTIAN SCHIEBAHN
AKE 9.1	Tue	9:30–10:00	H3	Multi junction concepts for photovoltaics and artificial photosynthesis: Critical points of current and future high-performance solar energy conversion — ●THOMAS HANNAPPEL
AKE 11.1	Tue	14:00–14:30	H3	Der Reaktorunfall von Fukushima - Ursachen, Ablauf und Folgen des Unfalls sowie Maßnahmen zur Bewältigung der Unfallfolgen — ●WALTER TROMM, MARTIN BRANDAUER, ROBERT STIEGLITZ
AKE 11.2	Tue	14:30–15:00	H3	Der Reaktorunfall von Fukushima Dai-ichi: die radiologischen Konsequenzen für die Bevölkerung — ●ROLF MICHEL
AKE 12.1	Tue	15:00–15:30	H3	Energiegewinnung durch Nanostrukturierte Thermoelektrika: Von Thomas Seebeck zum thermoelektrischen Generator — ●KORNELIUS NIELSCH
AKE 13.1	Wed	9:30–10:00	H41	Globale Klimavariabilität im Industriezeitalter - Phänomene und Ursachen — ●CHRISTIAN-DIETRICH SCHÖNWIESE
AKE 13.2	Wed	10:00–10:30	H41	The 2°C climate policy goal: Chances & Challenges — ●HERMANN HELD
AKE 13.3	Wed	10:30–11:00	H41	How regional climate interacts with wind power generation — ●ROBERT VAUTARD
AKE 13.4	Wed	11:00–11:30	H41	Offshore-Windenergienutzung - Chancen, Herausforderungen und Auswirkungen aus meteorologischer Sicht — ●STEFAN EMEIS

Sessions

AKE 1.1–1.2	Mon	9:30–10:30	H3	Renewable Energy - Biomass, Geothermal Energy and CO ₂ -Sequestration
AKE 2.1–2.2	Mon	10:30–11:15	H3	Heat Pumps and Combined Heat and Power
AKE 3.1–3.1	Mon	11:30–12:00	H3	Trends and Innovations in the Energy Sector
AKE 4.1–4.1	Mon	12:00–12:30	H3	Strategies for Future Mobility
AKE 5.1–5.1	Mon	15:00–15:30	H3	Economic Aspects of the German Energy Turn
AKE 6.1–6.1	Mon	15:30–16:00	H3	Chemical Energy Storage for Electricity
AKE 7.1–7.3	Mon	16:00–17:00	H3	System Analysis and Hydrogen Economy
AKE 8.1–8.3	Mon	17:15–18:00	H3	CO ₂ Electro-Reduction
AKE 9.1–9.2	Tue	9:30–10:30	H3	High-Efficiency Photovoltaics (with CPP)
AKE 10.1–10.6	Tue	10:45–12:15	H3	Modelling of Energy Systems and Climate
AKE 11.1–11.2	Tue	14:00–15:00	H3	Fukushima - Five Years later
AKE 12.1–12.1	Tue	15:00–15:30	H3	Energy Applications of Thermoelectric Materials
AKE 13.1–13.4	Wed	9:20–11:30	H41	Energiewende und Klimawandel (with UP)

Annual General Meeting of the Energy Working Group (AKE)

The annual members' meeting of the AKE will be held during the spring meeting in Bad Honnef on April 21/22, 2016.