Energy Working Group
Arbeitskreis Energie (AKE)

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The programme of the Energy Working Group (Arbeitskreis Energie, AKE) provides a survey of major strands of energy R&D and technology based on physical chemical, biological and geological research. Furthermore, since energy R&D is linked to combatting the global climate change, the programme includes a symposium "Klimawandel – was nun?" (SYKW) jointly organized with the Environmental Physics Division.

For more than a decade the "Energiewende" is dominating the discussion of domestic energy research, supply and use, in particular regarding electricity (see e.g. the AKE/DPG-studies 2005 and 2010). With progress towards >30% of renewable electricity generation a "Wärmewende" (AKE 2) with massive improvements in the generation and use of heat must be addressed if a CO_2 reduction of 85% or more shall become feasible. It must, however, be kept in mind that the corresponding national economic effort will affect some 2% of the global green-house gas emission. This demonstrates the relevance of energy technology which can be implemented also in other parts of the world such as in the earth's solar belt (AKE 1).

Wind and solar electricity generation suffer from massive intermittency requiring very large installed overcapacities, a backup generation capacity close to the load level and very large (electricity) storage systems in particular for seasonal balancing. Hence the development of improved batteries, of chemical conversion "storage" / alternative use as well as of "sector-coupling" technologies is highly important (AKE 8, 10) as is, on regional scales, the optimization of grid requirements and deployment concepts (AKE 9).

Wind and photovoltaic generation will become the dominating global electricity source. More efficient and versatile wind turbines (AKE 7) and novel classes of PV materials (AKE 5) are therefore of interest. However, nuclear generation continues to play a significant role in CO_2-free electricity generation in many parts of the world (AKE 14). Base-load electricity and caloric contributions are provided by biomass (AKE 6) and, in parts of the world, volcanic or enhanced geothermal resources can be expected to grow in relevance (AKE 11). The long-term development of fusion energy (with the international flagship project ITER) aims at clean and safe electricity generation and less problems of nuclear waste (AKE 13).

A long-term relevant issue is to secure the availability of raw materials for energy and other uses. Here, R&D on submarine resources moves into focus (AKE 12). Novel research concepts into both biological (AKE 3) and solid-state based (AKE 4) fixation methods of CO_2 may provide interesting pathways for green chemical feedstock production and new options for mitigating the CO_2 problem.

The sequence of sessions is imposed to some extent by constraints in the availability of the speakers.

References:
http://dpg-physik.de/veroeffentlichung/broschueren/studien/energy_2011.pdf
http://dpg-physik.de/veroeffentlichung/broschueren/studien/energie_2010.pdf
http://dpg-physik.de/static/info/klimastudie_2005_eng.pdf.

Overview of Invited Talks and Sessions

(Lecture rooms RW HS and B 0.014)

Invited Talks

AKE 1.1	Mon	10:30–11:00	B 0.014	**Strom und Gas aus der Wüste als Option für eine globale Energiewende** — •Michael Düren
AKE 1.2	Mon	11:00–11:30	B 0.014	**Aquifer thermal energy storage systems ensuring continuous cooling in arid climates compared to applications in Europe** — •Felina Schütz

AKE 2.1	Mon	11:30–12:00	B 0.014	**Wärmewende weltweit: Mit solider Physik kann das gelingen** — •Wolfgang Feist
AKE 2.2	Mon	12:00–12:30	B 0.014	**Die Rolle der Fernwärme bei der Energie- und Wärmewende** — •Manuel Rink
AKE 3.1	Mon	14:00–14:30	B 0.014	**CETCH me if you can - Bringing inorganic carbon into life with synthetic CO_2 fixation** — •Tobias Erb
AKE 4.1	Mon	14:30–15:00	B 0.014	**Solid State Photoelectrochemical Devices for Artificial Photosynthesis: State-of-the-Art and Perspectives** — •Roel Van de Krol
AKE 5.1	Mon	15:00–15:30	B 0.014	**Current developments and perspectives for polymer-based and metal-halide perovskite solar cells** — •Thomas Kirchartz
AKE 6.1	Mon	15:30–16:00	B 0.014	**(K)eine Wende ohne Bioenergie? - Die Rolle der Biomasse in unserer künftigen Energiewirtschaft** — •Jürgen Karl
AKE 7.1	Mon	16:15–16:45	B 0.014	**Neue Entwicklungen in der Windenergieforschung - warum Windenergie ein spannendes Feld für die Physik ist** — •Stephan Barth
AKE 8.1	Tue	16:15–16:45	RW HS	**Performance analysis of Lithium-ion-batteries: status and prospects** — •Ellen Ivers-Tiffée
AKE 8.2	Tue	16:45–17:15	RW HS	**Clean Energy Revolution in Sea Transport** — •Christoph Kandziora
AKE 9.1	Tue	17:15–17:45	RW HS	**Zum optimalen Zubau von Netzkapazität und Erneuerbaren Energien im liberalisierten Strommarkt** — •Veronika Grimm
AKE 10.1	Wed	14:00–14:30	RW HS	**Sektorenkopplung - Potenziale und Optionen für die nächste Phase der Energiewende** — •Cyril Stephanos
AKE 10.2	Wed	14:30–15:00	RW HS	**CO_2 to Value: Single Step Direct Electrocatalytic Reduction of CO_2 Toward CO and Hydrocarbons** — •Guenter Schmid
AKE 11.1	Wed	15:00–15:30	RW HS	**Geothermal energy - from conventional to unconventional resources** — •Egbert Jolie
AKE 12.1	Wed	15:30–16:00	RW HS	**Geophysikalische Untersuchungen von Rohstoffen im Meer - Exploration und Nutzungsperspektiven** — •Katrin Schwalenberg
AKE 13.1	Wed	16:15–16:45	RW HS	**Progress in ITER construction and in the preparations for operation** — •David J Campbell
AKE 14.1	Wed	16:45–17:15	RW HS	**The Role of Nuclear Power in the World** — •Ludger Mohrbach

Invited talks of the joint symposium Klimawandel – was nun?

See SYKW for the full program of the symposium.

SYKW 1.1	Tue	14:00–14:30	RW HS	**Das Ende der Eis-Zeit?** — •Dirk Notz
SYKW 1.2	Tue	14:30–15:00	RW HS	**Dekarbonisierung des globalen Energiesystems: Optionen und kosteneffiziente Strategien** — •Thomas Bruckner
SYKW 1.3	Tue	15:00–15:30	RW HS	**Retten die Klimaingenieure die Welt?** — •Jost Heintzenberg
SYKW 1.4	Tue	15:30–16:00	RW HS	**Anpassung an den Klimawandel: was kommt auf uns zu und wie müssen wir reagieren?** — •Daniela Jacob

Sessions

AKE 1.1–1.2	Mon	10:30–11:30	B 0.014	**Energiewende in the Earth's Solar Belt**
AKE 2.1–2.2	Mon	11:30–12:30	B 0.014	**Energiewende - Konzepte zur Wärmewende**
AKE 3.1–3.1	Mon	14:00–14:30	B 0.014	**Pathways for Biological Photosynthesis and Carbon Fixation**
AKE 4.1–4.1	Mon	14:30–15:00	B 0.014	**Solid State based Artificial Photosynthesis**
AKE 5.1–5.1	Mon	15:00–15:30	B 0.014	**Photovoltaics: Novel Approaches**
AKE 6.1–6.1	Mon	15:30–16:00	B 0.014	**Biomass in a future Energy Supply**
AKE 7.1–7.5	Mon	16:15–17:45	B 0.014	**Wind Energy**
AKE 8.1–8.2	Tue	16:15–17:15	RW HS	**Energy for Mobility - High Performance Batteries for Vehicles and Clean(er) Marine Transport**
AKE 9.1–9.3	Tue	17:15–18:15	RW HS	**Renewable Electricity: Grid and Deployment Aspects in Liberalised Energy Markets**
AKE 10.1–10.2	Wed	14:00–15:00	RW HS	**Sector Coupling and Production of Chemical Feedstock by Electrocatalytic Reduction of CO_2**
AKE 11.1–11.1	Wed	15:00–15:30	RW HS	**Geothermal Energy from Unconventional (Volcanic) Resources**

AKE 12.1–12.1	Wed	15:30–16:15	RW HS	**Submarine Energy and Mineral Resources**
AKE 13.1–13.1	Wed	16:15–16:45	RW HS	**Nuclear Fusion - The ITER Project**
AKE 14.1–14.1	Wed	16:45–17:15	RW HS	**Nuclear Fission in the International Context**

Annual General Meeting of the Working Group on Energy

The annual members' meeting of the AKE will be held during the AKE spring meeting in Bad Honnef on the late afternoon of April 19, 2018. No elections will be on the agenda.