

Clean Energy from Biomass

Section of the International Energy Agency Meets at the KIT – Focus Is on the Environmentally Compatible and Efficient Production of Synthesis Gas



The Bioenergy Task 33 Section of the International Energy Agency at the KIT Energy Lab. (Photo by: ITC-TAB)

Experts assume that most of the worldwide energy consumption in the medium term also will have to be covered by chemical fuels. This means: Use of fuels of low calorific value, such as biomass, waste, or oil sand, will increase due to limited resources. Research is aimed at converting these low-quality fuels into usable energy at high efficiency in a climate-friendly manner. Experts of the International Energy Agency recently met at the KIT to discuss the production of high-quality fuel from biomass.

The Bioenergy Task 33 Section of the International Energy Agency (IEA) focuses on thermal gasification of biomass by high-temperature processes. The high-quality gases produced can be used for either the generation of electricity and heat at a power plant or the production of



KIT Energy Center: Having future in mind

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high-quality fuels and basic chemical materials. It is the objective of IEA's Bioenergy Task 33 to overcome technical obstacles in this field of research, to accelerate the use of new technologies on the market, and to intensify information exchange between industry and research in the member states. At their meeting from May 13 to 15 on the northern campus of the KIT, 20 participants from ten member states discussed various technical processes in this field and reported about the political and economic boundary conditions in their countries. As a result of the discussion, tasks were defined and main activities were specified for the coming three years. The program also included a visit of research facilities relating to the use of fossil and biogenic fuels for energy production on the northern campus (Energy Lab).

Another 20 experts from science and industry met at a workshop on the production of synthesis gas from biomass. This workshop is concluded today by an excursion to the research laboratories of the industry partner Lurgi GmbH at Frankfurt.

"The challenge in the production of synthesis gas lies in the fact that high-temperature processes have to be designed in an energy-efficient, low-pollutant, and climate-compatible manner – in spite of the low quality and sometimes high pollutant fraction of the feedstocks", underlines the host, Professor Thomas Kolb, from the KIT Institute for Technical Chemistry.

Fuel and basic chemical materials may be produced from biomass-based synthesis gases by the bioliq[®] process developed by Forschungszentrum Karlsruhe. “We can offer a rather promising concept, since the combination of decentralized preliminary biomass treatment with centralized gas production and synthesis is tailored to the regionally distributed arisings of biomass. Hence, economically efficient plant sizes can be reached”, says Kolb.

By means of the multi-stage bioliq[®] process, fully synthetic diesel or Otto fuel can be produced from straw and other agricultural and forestal feedstocks. The quality of this diesel or Otto fuel exceeds that of other biofuels and even that of mineral oil products. In a first step, biomass is converted into a pumpable fuel by decentralized flash pyrolysis. In the following gasification stage, the intermediate product is converted into synthesis gas. The process is presently being implemented on the pilot scale (capacity: 1 ton per hour) on the site of Forschungszentrum Karlsruhe.

As an alternative, the burning gas produced by biomass gasification may be used in a combined power plant with a gas turbine. High energy efficiencies are achieved. “Apart from the high efficiencies, gasification technology also allows for an efficient separation of carbon dioxide (CO₂) from the power plant process”, underlines Kolb. The three days’ meeting of the IEA section also focused on how this can be accomplished technically and in an economically efficient manner.

The **International Energy Agency (IEA)** was founded in 1973 by 16 industrialized nations during the first oil crisis. It is a cross-national organization for advising politics in the field of energy and presently has 28 member states. Its fields of work are climate policy, the reform of the energy market, and cooperation in the field of energy technology, in particular with countries being the main producers of fuels or having strongly growing energy needs, such as China, India, Russia, and the OPEC states.

The Karlsruhe Institute of Technology (KIT) is one of Europe's leading energy research establishments: The KIT Energy Center pools fundamental research with applied research into all relevant energy sources for industry, households, services, and mobility. Holistic assessment of the energy cycle also covers conversion processes and energy efficiency. The KIT Energy Center links competences in engineering and science with know-how in economics, the humanities and social science as well as law. The activities of the KIT Energy Center are organized in seven topics: Energy conversion, renewable energies, energy storage and distribution, efficient energy use, fusion technology, nuclear power and safety, and energy systems analysis.

The Karlsruhe Institute of Technology (KIT) is the merger of the Forschungszentrum Karlsruhe, member of the Helmholtz Association, and the Universität

Karlsruhe. This merger will give rise to an institution of internationally excellent research and teaching in natural and engineering sciences. In total, the KIT has 8000 employees and an annual budget of 700 million Euros. The KIT focuses on the knowledge triangle of research – teaching – innovation. It sets new standards in the promotion of young scientists and attracts top scientists from all over the world. KIT is an important innovation partner of industry.

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