AKE 1: Renewable Energy - Biomass, Geothermal Energy and CO_2-Sequestration

Time: Monday 9:30–10:30 Location: H3

Invited Talk AKE 1.1 Mon 9:30 H3

Processes for Advanced Fuel Production from Biomass — •Jörg Sauer — Institute of Catalysis Research and Technology (IKFT), Karlsruhe Institute of Technology (KIT), Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany

A survey is given of the potential and production pathways of modern low emission synthetic fuels which are required in the context of the "Energiewende". Unlike so-called "1st generation biofuels", technologies for synthetic biofuels are based on carbon-sources that are not competing to the production of food and animal feed. Methanol and Dimethylether (DME) are accessible through state-of-the-art production processes and will be important intermediate components for synthetic biofuels. Ongoing process development for Methanol and DME will lead to increased stability against fluctuations in feedstock and energy supply.

Several strategies are known for the production of fuels from Methanol and Dimethylether, both for oxygen-containing (oxygenate) fuels and oxygen-free fuels (hydrocarbons). The former offer the advantage of clean combustion and reduced emissions, the latter have high energy densities. The oligomeric oxymethylene dimethyl ethers (OMEs) are highly interesting oxygenate components for application as future diesel component. The production and application is still on a comparatively early stage of development. However, they exhibit beneficial combustion properties with potential for emission reduction. Especially OME-3 to OME-5 are targeted due to their favorable physico-chemical properties.

Invited Talk AKE 1.2 Mon 10:00 H3

Combined CO_2-storage and geothermal energy extraction: potential and options — •Martin O. Saar — ETH Zurich, Switzerland

Using carbon dioxide (CO_2) as the geothermal energy extraction fluid has several advantages over water such as 1) the energy conversion efficiency to electricity is typically twice that of water, 2) valuable water resources are protected, and 3) the system results in permanent geologic CO_2 sequestration, a key method to mitigate global climate change. The result is a high-efficiency CO_2-sequestering geothermal power plant with a negative carbon footprint that can operate in regions with relatively low geothermal heat flow and/or low reservoir permeabilities. As a result, this technology expands the geothermal resource base, while making carbon capture and storage (CCS) more economically competitive. Furthermore, such a renewable, geothermal power plant may be combined with other unconventional geothermal technologies such as auxiliary heating of geothermally preheated geofluids. Potential challenges of CO_2-geothermal systems include ensuring caprock integrity, CO_2 availability, and general public acceptance of underground CO_2storage technologies.

In this presentation, I will address the potential of, and various options for, CO_2-based and other unconventional geothermal systems, particularly for relatively low subsurface heat flow conditions as those that exist throughout Germany. I will also point out the challenges of CO_2-based geothermal energy extraction and provide some examples of research addressing those challenges.