

Gas Hydrate and CCS Research: An Interface Between CH-Exploration Industry, Science and Climate Change

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In the current discussion about still growing energy demands, decreasing carbon resources and climate change it has become obvious that alternate energy resources are on great demand in the future. With the extended installation of sun and wind driven power generators flexible power plants are required to compensate variations in production. Here gas driven power plants provide the best performance, while their CO₂ emission is only 50 % of a similar coal plant. Moreover it turned out that the anthropogenic effect on climate change by CO₂ emissions cannot be reduced to large extends in short time. Consequently efforts to collect existing gases and store them elsewhere are necessary to decrease the input of CO₂ into the atmosphere. Land deposits for CO₂ are, on first sight, easy to find and offer easiest access for storing CO₂.

However storage safety, influence of other pore fluids and in particular possible interaction of economic activity within the storage area may not be easily assessed. Within this context marine gas hydrates offer a two-fold chance to gain access for new gas reservoirs and CO₂ storage sites. Gas hydrates (GH) are a cage structure formed by water molecules, which incorporate natural gas (mainly methane) in a solid matrix. GH is present in marine sediments at about 700 m water depth where temperature and pressure provide the gas hydrate stability field. Increasing temperature or decreasing pressure in the reservoir will immediately result in dissolution of the hydrate and provide free gas. Would CO₂ be exposed to the hydrates it would start to take place in the hydrate and release a portion of methane. In terms of fossil carbon energy supply natural gas is the most environment friendly source. CO₂ storage as a solid hydrate in the marine subsurface provides the most secure sequestration technique (immobile, away from urban communities). The German research project SUGAR (“Submarine Gashydrat-Lagerstätten: Erkundung, Abbau und Transport”) set out to develop technology and know how within the complete sequence of exploration, exploitation, production and transport in order to make use of gas hydrate reservoirs as new energy resource and CO₂ sequestration site.

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