Solution Mining Research Institute Fall 2015 Technical Conference
Santander, Spain, 28 - 29 September 2015

Basic Data, Information System & Potential Estimation for Site Selection of Salt Caverns for Energy Storage

Dirk Zander-Schiebenhöfer, Sabine Donadei & Peter-Laszlo Horvath
KBB Underground Technologies, Hannover, Germany

Dirk Zapf, Kurt Staudtmeister & Reinhard B. Rokahr
Leibniz Universität Hannover, IGtH, Hannover, Germany

Stephanie Fleig, Lukas Pollok, Markus Hölzner & Jörg Hammer
Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, Germany

Sascha Gast, Cornelia Riesenberg & Gabriela von Goerne
Bundesanstalt für Geowissenschaften und Rohstoffe, Berlin, Germany

Abstract

Storages for electrical energy will play a major role in the future because of the transition to fluctuating renewable energy sources. One option is storage power plants which can operate on demand at a grid scale by the injection and removal of compressed air or hydrogen produced from renewable sources of electricity. The large-scale storage of these media in such a scenario can only take place in subsurface geological structures. Because of the unique geological conditions, there is huge potential in North Germany for the construction of salt cavern storages. There is still a need, however, to create a suitable basis for the evaluation of different storage locations, as well as to reliably estimate the volumes of energy which are ultimately storable in underground geological structures in Germany.

The elaboration and provision of basic design criteria, geological-geotechnical basic data, and location selection criteria, for the construction of hydrogen and compressed air storage caverns, is the focus of the joint project “InSpEE – Information system salt structures: planning basis, selection criteria and estimation of the potential for the construction of salt caverns for the storage of renewables (hydrogen and compressed air)”. This is used as the basis for estimating the storage potential of North German salt structures for renewables in the form of hydrogen and compressed air. The basic data elaborated as input for estimating the storage potential comprises the elaboration of geological maps of salt occurences at predefined depths, the development of structural categories for the different salt deposits, the classification of the salt structures according to these categories, the geomechanical evaluation of the storage media and the mode of operation of the storages, and the determination of the relevant criteria which the salt structures have to satisfy for the construction of a storage cavern. At the end of the project, a public information system “Salt” will be available, and a figure will be given for the potential storage capacity in North Germany. The project is currently in the final phase involving the estimate of the storage potential, and will be completed in September 2015. The project was partially financed by the German Federal Ministry for Economic Affairs and Energy (BMWi) within the scope of the Funding Initiative for Energy Storage established by the German

Federal Ministries for Economic Affairs and Energy (BMWi), for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) as well as of Education and Research (BMBF).

The following chapters present the findings which have been achieved so far.

Key words: Caverns for Gas Storage, Compressed Air Energy Storage (CAES), Domal Salt, Geology, Germany, Hydrogen Storage, Potential Estimation, Rock Mechanics, Storage Cavern