

# Geomechanical analysis of salt caverns used for underground storage of hydrogen utilised in meeting peak energy demands

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## Abstract

The geomechanical design of a H<sub>2</sub> storage salt cavern subjected to diurnal and seasonal storage operating cycles has been investigated. The investigations provided a better understanding of the geomechanical response of H<sub>2</sub> storage caverns by employing coupled thermo-mechanical numerical analyses. A salt cavern, located at a depth of 1.8 km, has been investigated by employing non-linear elasto-visco-plastic thermo-mechanical analyses by considering: the characteristics of the geological formations around the cavern, the changes in temperature and stress concentrations related to the H<sub>2</sub> storage operations and the in situ geostatic stresses that characterise the cavern's location. This work has proven the importance of using a coupled thermo-mechanical analysis to assess the geomechanical integrity of H<sub>2</sub> storage caverns.