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IMPACT OF SALT CAVERN SIZE ON THERMODYNAMICS FOR GAS STORAGE

Cécile Mousset, Yvan Charnavel, Cyrille Pellizzaro, Grégoire Hévin
Storengy, France

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Introduction

Is a bigger cavern always the right answer? This question can be regarded from thermodynamical point of view. In recent years, new operating modes of salt cavern gas storage, including High Frequency Cycling, put forward thermodynamical studies and supported the development of simulation tools. This led to improve our understanding of thermodynamical phenomena involved in gas storage and in Compressed Air Energy Storage (CAES).

This paper proposes to study the influence of cavern size on thermodynamics for gas storage.

Storengy's advanced simulation tool DEMETHER is used to create the models presented below. Our approach is to break thermodynamics into single thermodynamical phenomena in order to get a better understanding of thermodynamics for salt caverns. First we will simulate thermal balancing between cavern and rock salt mass for different cavern sizes. This simulation will highlight the concept of thermal inertia of salt caverns. Then we will study the impact of cavern size on thermodynamics for the same gas withdrawal. We will then focus on the impact of gas injection temperature on working gas volume. Finally, we will illustrate the impact of cavern size on working gas volume. These simulations will give clues about suitable sizing of salt caverns in accordance with desired operating cycle.