

## ROLE OF THERMAL ENERGY STORAGE TECHNOLOGY IN THE DECARBONIZATION OF ENERGY SECTOR PROCESS – PACKED ROCK BED PARAMETERS ANALYSIS

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### Abstract

The paper presents the adiabatic installation of compressed gases energy storage. The authors present the results of analyzes for this type of installation due to the selection of thermal storage material. The simulations were carried out for basalt, granite and ceramics (alumina) as well as for porosity value from 0.375 to 0.39 of basalt-filled reservoirs in Thermal Energy Storage (TES) installation. Characteristics of outlet air temperature, air pressure drop amount of energy stored and external heat losses as a time functions during the charging phase are presented. The research indicated that due to the lowest density and average heat capacity of the materials studied, granite has the fastest and most intense physical exit loss from the storage tank which was approximately 1100 W. However, there was no significant effect on air pressure drop depending on the chosen accumulation materials. The effect of rock bed porosity on the pressure drop of flowing air was investigated. For a constant mass flow rate, pressure drop values ranging from 2200 Pa to 6200 Pa were obtained depending on the porosity value.

Keywords: Packed bed; Thermal energy storage; ANSYS Fluent; CFD; Adiabatic CAES.