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MULTIPHASE GEO-ENERGY PRODUCTION ON MARS USING GEOLOGIC CO2 STORAGE IN THE SEDIMENTARY BASINS

Abstract

A number of settlement missions have been announced in order to ensure the survival of a functioning human civilization on Mars. The availability of energy on the planet would be critical to the civilization's long-term sustainability and expansion. Astronauts would need to use the planet's resources to ensure their survival if they were to be self-sustaining. Solar energy has been proposed as one of the options for meeting the energy needs of the future civilization. However, in the event of a dust storm or at night, solar energy would be insufficient. In some cases, this would put an end to exploratory tasks and day-to-day activities. In this paper, we propose a model of a geothermal energy system that harvests, stores, and dispatches energy from the geothermal system to electric grids by utilizing the subsurface's fluid and thermal storage capacity, as well as the geological subsurface carbon content. The model's carbon content would be extracted from the Martian atmosphere and injected deep into the saline aquifers, creating pressure and causing a flow of brine. The brine serves as an auxiliary fluid in the extraction of heat from proposed geothermal sites on Mars, which can then be used to generate electricity. The proposed model consists of a concentric structure of four rings of injection and production wells that generate a hydraulic mound that aids in the trapping of increased pressure, carbon content, and generated heat. Thermal energy is extracted from the carbon content, which can then be heated again, resulting in a cyclic process. Because of the model's unique structure, the energy content of the geo-surface can be extracted as needed by the astronauts. This helps to reduce reliance on solar energy by providing an optimal source of alternative energy even during the night and during desert storms.