

The Springhill Formation (Jurassic-Cretaceous) as a potential low enthalpy geothermal reservoir in the Cerro Sombrero area, Magellan Basin, Chile.

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The reuse of abandoned hydrocarbon wells offers the opportunity to minimize and reduce investment costs and improve the economic viability of projects with geothermal potential, to replace the use of conventional energy sources by renewable sources. In Chile, the interest in applying this technology is in the Magallanes Basin/Austral Basin in the extreme South of the country, where hydrocarbon deposits have been exploited for more than six decades. The hydrocarbons have been extracted from the Springhill Formation (Upper Jurassic-Lower Cretaceous).

The study focused on the Cerro Sombrero hydrocarbon deposit located in the northern portion of Tierra del Fuego, this town has 30 abandoned hydrocarbon wells within a radius of less than 5 km. To estimate in detail the behavior and distribution of the lithofacies of the Springhill Formation in the deposit, three models of geological blocks have been generated from porosity, sand content and the spatial distribution of these lithofacies, along with seismic data of the area and collection of thermal profiles. To understand the quality of the reservoirs, petrophysical analysis, confining pressures, relative permeability and thermal conductivity of representative control samples were carried out.

The results confirm the existence of two lithofacies of quartz-rich sandstones as potential geothermal reservoirs and a geothermal gradient in the 50 °C/km area. In Cerro Sombrero, the average annual temperature is 6.4 °C, which requires a constant domestic heating that comes exclusively from natural gas. The study shows the possibility of changing this heating model based on fossil fuels by a district heating system based on geothermal energy, using the proposed reuse of two oil wells in a closed system, which reach up to 2000 m depth and temperatures above 100 °C.

Acknowledgments to FONDAP-CONICYT Project 15090013 and ENAP.