Mines could provide geothermal energy

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Village that could benefit from geotermic energy. Credit: Rodríguez et al. / SINC

Mine shafts on the point of being closed down could be used to provide geothermal energy to local towns. This is the conclusion of two engineers from the University of Oviedo, whose research is being published this month in the journal *Renewable Energy*. The method they have developed makes it possible to estimate the amount of heat that a tunnel could potentially provide.

"One way of making use of low-intensity geothermal energy is to convert mine shafts into geothermal boilers, which could provide heating and hot water for people living nearby", Rafael Rodríguez, from the Oviedo Higher Technical School of Mining Engineering, tells SINC. This type of energy, which is hardly used in Spain, is obtained from the internal heat of the Earth.

The engineer and his colleague María Belarmina Díaz have developed a "semi-empirical" method (part mathematical and part experimental) to calculate the amount of heat that could be produced by a mine tunnel that is due to be abandoned, based on studies carried out while it is still in use.

"When the mine is still active one can access the tunnels easily in order to gather data about ventilation and the properties of the rocks, as well as to take samples and design better circuits, and even programme the closure of some sections in order to use them for geothermal energy production", says the engineer, who stresses that, although geothermal energy can be made use of once the mine is closed, "it is no longer possible by that stage to make any modifications, or to gather any useful data to evaluate and improve the system".

The study looks into geothermal exploitation of a two-kilometre-long mine shaft, in which the temperature of the rocks 500m below the surface is around 30º C. This is typical of many of the mining areas in Asturias, although it could also be applied to other parts of the world. Water could be forced in through tubes at 7º C and return at 12º C, a big enough heat gain to be of benefit to towns located above the mines.

Advantages of geothermal energy from mines

Rodríguez and Díaz highlight the benefits of building geothermal boilers in mine shafts in that, aside from their predictable energy production levels, they also function practically as an open tube system "but without any risk of heat contamination of aquifers".

Using geothermal energy also helps to reduce CO2 emissions, and is not dependent upon climatic conditions (unlike other renewable energies such as solar or wind power). Other advantages are that these facilities make use of a country's own resources, do not require new developments

on large sites, do not pollute the immediate environment, and are believed to be profitable over the long term.

Geothermal energy can be used directly in family homes, housing developments, swimming pools, fish farms, industrial units and other buildings.

More information: Rafael Rodríguez, María B. Díaz. "Analysis of the utilization of mine galleries as geothermal heat exchangers by means a semi-empirical prediction method". Renewable Energy 34 (7): 1716, 2009.

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