TAGESSPIEGEL BACKGROUND

Energie & Klima

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Interest in white hydrogen grows

So far, hydrogen has to be obtained with high energy use. But now there are more evidence that there are more pure occurrences in nature than assumed. While in the United States, Australia, France and Spain the extraction of so -called white hydrogen is promoted, the topic in Germany is encountered with scepticism.

Instead of making complex hydrogen from natural gas or water, it could simply be taken from the depths of the earth, similar to natural gas and petroleum. Because no large amounts of naturally occurring hydrogen were known, this option has so far not played a role. But a company now wants to produce hydrogen directly in northern Spain.

Last year, the Helios Aragón company, founded in Singapore (https://helios-aragon.com/aragon-project/), completed its first exploration work in the Spanish region of Aragón and met with great occurrence of hydrogen and helium as a by-product. "Probably the reserve of natural hydrogen in the Monzón field is 1.1 million tons," said CEO Ian Munro at the request of *Tagesspiegel Background*. Munro continues from the occurrence with an annual production volume of 50,000 tons for 20 plus years. For comparison: Spain's industry currently consumes 500,000 tons annually.

Of course, naturally occurring hydrogen would not only be a clean energy source, but also very cheap. The geochemist Alain Prinzhofer, formerly at the Institut de Physique du Globe de Paris (https://www.ipgp.fr/en/en/), estimates the costs for half up to one US dollar per kilogram. According to the international energy agency (IEA), a kilogram of grey hydrogen from natural gas costs between one and three US dollars.

In the production process of hydrogen from natural gas and without CO2 capture, ten to 15 kilograms of CO2 equivalents are also released into the atmosphere. Global production is around 80 million tons per year and causes around one billion tons of CO2. For green hydrogen, water is split into oxygen and hydrogen by electrolysis and using renewable energies. Due to the high costs - between three and seven US dollars per kilogram according to the IEA - green hydrogen is currently not competitive and must therefore be subsidised.

White hydrogen not regulated by law

In Spain, Helios Aragón is now awaiting exploration permits for the second phase of its project in the Monzón field. Munro's main problem: In 2021, a climate protection law came into force in Spain that bans the exploration and production of fossil fuels. The Spanish legislator includes hydrogen in this category, although it is not a fossil hydrocarbon. Since pure hydrogen has not yet been developed in Spain or Europe, there are no explicit regulations in most EU countries. An exception here is France, which included the promotion of natural hydrogen in its mining law (https://www.vie-publique.fr/loi/284827-ordonnances-13-avril-2022-reforme-code-minier) in April 2022.

This regulatory situation could be painful for Helios Aragón, because there are further occurrences of white hydrogen, according to the company, in Central Europe. The company founded another subsidiary in Poland in November.

And in the coming months it could also make applications for exploration in Germany, as Munro emphasized. According to the Federal Institute for Geosciences and Raw materials (BGR), there are indications of occurrence in Germany, for example in Leupoldsgrün in Upper Franconia, where increased hydrogen content in the rock was measured in the 1960s. The German hydrogen and fuel cell association has no specific data for German finds.

However, the BGR is sceptical about the potential of natural hydrogen. In an analysis of the BGR from June 2020 (https://www.bgr.bund.de/de/gemeinsames/aktuelles/2020/2020-06-18_PM_BGR-Kurzstudie Hydrogen Potential-In-In- Untergrund.html) the authors assume that the production of hydrogen through electrolysis, steam reformation or methane pyrolysis is currently the most likely option. "So far, no finds of hydrogen have been demonstrated in the geological subsurface of the size of commercially used natural gas fields," it says.

German raw materials authority is sceptical

"The current state of knowledge is that it is not exactly clear where the hydrogen comes from and how it accumulates," said Dieter Franke, geophysicist at BGR, to *Tagesspiegel Background*. However, these two questions would have to be clarified before reliable quantities that could be recovered could be estimated. But you should always be open. The BGR is planning a project to better understand the geology, says Franke.

In addition to Helios, Michael Hart, board member of the American-British investor group Beam Earth, which is behind several hydrogen projects in the USA, also contradicts this reluctance. "There is no question that the amount [natural hydrogen] is huge," said Hart to *Tagesspiegel Background*.

In 2012, a pilot project proved that natural hydrogen can be used in practice. In the savannah from Mali the businessman Aliou Boubacar Diallo with the Malian-Canadian company Petroma (today: Hydroma) discovered an occurrence with conventional drilling methods and provided the village of Bourakébougou for years.

The pilot project attracted the interest of geologist Alain Prinzhofer, who traveled to Mali in 2018 to examine the occurrence in more detail. His results are hopeful. Surface measurements showed further occurrence at a distance of up to 150 kilometers. Prinzhofer claims in a scientific article published in 2018 (https://www.sciencedirect.com/science/article/ABS/PII/S0360318327861?Via=ihub) that natural hydrogen could be a sustainable source in contrast to natural gas or oil. Another indicator of this is the fact that there was no pressure drop in Mali during the entire production period of hydrogen. Today, it is assumed that hydrogen even forms continuously through geochemical processes under certain geological conditions.

No mention in a national hydrogen strategy

In the national hydrogen strategy of Germany, white hydrogen is not mentioned. Munro calls on legislators, including Germany, to follow the example of France and to include exploration and production in mining laws. The Lower Saxony State Mountain (LBEG) confirms that hydrogen is currently not listed as a mountain -free or basic soil treasure.

The Federal Ministry of Economics currently refrains from adaptation to the law. “Significant traces of hydrogen are known from wells in Germany. However, according to the Federal Government, the occurrence known today contains only small amounts of hydrogen, which currently do not allow or at least only very limited local economic use, ”said a spokeswoman on request.

News is piling up worldwide about the search for natural hydrogen. In 2021, Australia recorded 18 exploration applications of six companies. There are further projects in Colombia, Brazil and the Republic of Congo. The chemist Viacheslav Zgonnik from Ukraine, who carried out the first hydrogen bores in the USA with his company Natural Hydrogen Energy (http://nh2e.com/) in 2019, told the magazine "Science" (https: // www. Science.org/Content/Article/Hidden-Hydrogen-Earth-May-Hold-Vast-Stores-Renewable-Carbon Free-Fuel), he was convinced that natural hydrogen has to "replace all fossil fuels".