Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.36283

THE PONTPIERRE H_2 DEEP WELL: A WORLD FIRST COMBINING FUNDAMENTAL AND OPERATIONAL RESEARCH ON NATURAL HYDROGEN RESOURCE.

RAYMOND MICHELS[1], JACQUES PIRONON[1], PHILIPPE DE DONATO[1], MÉDÉRIC PIEDEVACHE[2], MATHIEU LAZERGES[1], CATHERINE LORGEOUX[1], AURÉLIEN RANDI[1], DR. ODILE BARRÈS, PHD[1], MARIE-CAMILLE CAUMON[1], VITALIY PRIVALOV[1], FABRICE MALARTRE[1], YVES GÉRAUD[1], MARC DIRAISON[1], LAURENT BECCALETTO[3], FRÉDERIC MATHURIN[3], ANTOINE FORCINAL[4] AND FADY NASSIF[4]

[1]Géoressources, CNRS, Université de Lorraine
[2]Solexperts
[3]BRGM (French Geological Survey)
[4]LFDE

The Pontpierre H_2 well, operated by la Française de l'Energie within the REGALOR 2 project is the world's first well drilled specifically for fundamental research on natural hydrogen at great depth. Designed to reach 4000m by March 2026, the well is being drilled within the thick (~8000m) Carboniferous strata of the Lorraine coal basin.

The drilling objectives were defined on preliminary studies conducted at the nearby Folschviller 1 well, where the innovative in-situ SysMoG™ GH2ASBUSTERS monitoring system was used to measure concentrations of gas species dissolved in the aquifer to 1250m depth. Methane was recognized as the major constituent of dissolved gases. However, while it was absent at surface and depth <100m, the hydrogen content of the dissolved gas mixture increased regularly reaching 18mol% at 1250m. Modeling of the hydrogen diffusion profile suggests a progressive increase in hydrogen to reach 76mol% of the dissolved gas at 3000m. Therefore, the SysMoG™ GH2ASBUSTERS system will measure the hydrogen concentration profile within the aquifer between 2000m to 3000m for confirmation. Aqueous solutions will also be collected at depth at reservoir conditions for characterization. In terms of hydrogen production, the REGALOR 2 program will test a new technology developed to separate hydrogen from water within the aquifer, at depth. This recovery method would enable hydrogen production with minimal environmental impact.

The discovery of the hydrogen occurrence in the Lorraine Carboniferous basin represents a major paradigm shift. Indeed, coal bearing strata have not previously been considered as potential hosts for a native hydrogen resource. In this context, the hydrogen is present as dissolved gas in the aquifer and not contained in petroleum-type traps. Current data suggest the possibility of a still active generative source located deeper than 5000m. Consequently, a preliminary "hydrogen system" model must be considered. In this regard, the Pontpierre H_2 well should provide new information that will significantly advance our understanding on natural hydrogen.

REssources GAzières de LORraine is cofounded for REGALOR 1 by Etat (Pacte Lorraine), Région Grand Est, EU (Fond Européen de DEveloppement Régional) 2018-2023, for REGALOR 2 by Région Grand Est and EU (Fond de Transition Juste) 2025-2028.