



Università degli Studi di Napoli Federico II

PhD in Biotechnology - 37th cycle

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**Moving toward hydrogen:
the microbiology of Underground Hydrogen
Storage (UHS)**

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Renewable Energy Sources are an integral part of the (PNR and SNSI) national strategy for the transition to alternative and non-polluting energy sources, but their nature makes their use on a large scale problematic. The production of green hydrogen from the surplus of renewable energy is one of one the green technologies aiming to cross this limit. Storage solutions for hydrogen include depleted natural gas reservoirs. When hydrogen is stored underground, the in situ microbial communities [1] use it as an electron donor, consuming important fractions of stored hydrogen. There is a large subsurface ecosystem capable of interacting with the deep geochemical cycles and volatiles present in Earth's crust [2,3]. By-products of metabolisms (H_2S) can damage the production infrastructure, reducing the H_2 extraction efficiency [4]. The project aims to investigate the underground hydrogen storage microbial diversity using metagenomic, culture and modelling approaches of hydrogenotrophic metabolisms, all in collaboration with Eni S.p.A..

References

1. Merino et al. 2019. *Frontiers in Microbiology* 10: 780.
2. Magnabosco, C., et al. 2018. *Nature Geoscience* 11.10 : 707-717.
3. Fullerton et al. 2021. *Nature Geoscience* 14, 301–306.
4. Thaysen et al. 2021. *Renewable and Sustainable Energy Reviews* 151, 111481.