CIVIL AND ENVIRONMENTAL ENGINEERING

DM 630/Geosolving - Reuse of existing tunnels for energy storage

Funded By	GEOSOLVING S.R.L. [P.iva/CF:11591760019] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584]
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Context of the research activity	The PhD project will focus on the study and development of innovative solutions for retrofitting existing (operational or decommissioned) tunnels and underground spaces in urban areas for thermal energy production and storage. The research aims to contribute to the achievement of energy stability in Italy and Europe, in line with the European Green Deal, and contributes to the reduction of dependence on fossil fuel sources and decarbonization of the residential sector, which today still uses less than 30 per cent renewable sources for thermal supply. Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP E14D24002410004
Objectives	The doctoral study will help define the feasibility of using existing tunnels to host renewable energy storage systems consisting of high-temperature and high-pressure liquid, studying their integration into future heating networks, including social acceptance and cost-effectiveness. In Italian and European urban areas, many abandoned or disused existing underground spaces could benefit from an intelligent and sustainable approach and be redeveloped for energy purposes with positive impacts on socioeconomic activities. The advancement of the state of the art will be achieved through the sizing of innovative technological solutions, monitoring and analysis of data from experimental sites, and numerical modelling for understanding the thermo-hydro-mechanical behaviour of the linings and the surrounding soil of the tunnels used for storage. This outcome will be enhanced by increasing general knowledge on the behavior and applicability of energy geostructures, i.e. the thermal activation of underground structures (piles, retaining structures, tunnel linings). The research will be conducted together with the engineering company Geosolving Srl which is interested in the practical application of the

	technologies of energy retrofitting of geostructures.

Skills and competencies for the development of the activity	The candidate should show knowledge of geotechnical engineering and numerical modelling methods.