30 de noviembre 2023
November 30th

5° Congreso Mexicano de ingeniería de túneles y obras subterráneas
5th Mexican Congress of Tunnel Engineering and Underground Works

5 CONGRESO MEXICANO DE INGENIERÍA DE TÚNELES Y OBRAS SUBTERRÁNEAS

16:20 – 17:25 CDMX

THE DESIGN OF ENERGY TUNNELS FOR SUSTAINABLE CITIES

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Full Professor of Geotechnical Engineering at the Politecnico di Torino and an expert consultant for tunnelling and slope stability problems. He leads a research group active in the field of laboratory testing on soils and rocks, numerical modeling, tunnel excavation, slope stability, geotechnical monitoring and energy geostructures (www.rockmech.polito.it). He is the Editor in Chief of the ASCE International Journal of Geomechanics, the President of ELGIP - European Large Geotechnical Institutes Platform and holds academic duties as the Rector's Advisor for sports activities, member of the University Quality Control Center and member of the Department's Board. Marco Barla is the author of a textbook, holds two patents (Enertun and Geothermskin) and published around two hundred scientific papers in international, and national journals and conference proceedings. He gained more than 20 years of experience as a consultant and founder of Geosolving srl, a full engineering company formerly a spin-off of the Politecnico di Torino.

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3 **Conferencia Magistral | Métodos numéricos en obras subterráneas**
Keynote lecture

Abstract

A new metro line is under design in the city of Torino (Italy). It comprises around 30 km of tunnels and 32 stations and will represent a new fundamental line for the metropolitan transport network, connecting the southwest area of the city to the northeast districts. In the boost of innovation of the tunnelling industry, of the challenges posed by climate change and the need to sustainable growth of cities, the metro project will embody an innovative use of the tunnel linings to also produce thermal energy to make the line independent from the energy point of view. The solutions adopted are the so-called energy geostructures, i.e. the thermal activation of the tunnel linings in order to exchange heat with the ground and provide thermal energy for the conditioning of the metro stations as well as for external users. Detailed 3D thermo-hydro coupled Finite Element numerical analyses are used to quantify the heat exchange and assess the thermal interaction within the ground. The design methodology adopted, which included specific site thermal and hydraulic characterisation, GIS procedures, coupled numerical modelling will be revealed and described, showing how the design of the world's largest ever planned usage of energy geostructures was achieved.

40 AÑOS Desarrollando el espacio subterráneo

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