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Report concerning the review of the thermal insulation options for cryogen transport channels and analysis of the state-of-the-art cryogenic couplings feasibility in laser drill system to define the best system construction options.

Lead Beneficiary: Wrocław University of Science and Technology (WUST)

Authors: M. Chorowski, Z.Rogala, M. Stanclik, K. Strzelecka, J. Kielar

Authors affiliations: Wrocław University of Science and Technology

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DeepU

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Disclaimer

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ABBREVIATIONS AND GLOSSARY OF ACRONYMS

Acronym	Extended definition
API	application programming interface
D	deliverable
DN	diameter nominal
HTC	heat transfer coefficient
LMTD	logarithmic mean temperature difference
LN	liquid nitrogen
LNG	liquid natural gas
m_LN	maximum required mass flow of liquid nitrogen
T	task
T_LN	liquid nitrogen temperature at the bottom of the borehole
VIP	vacuum insulated panels

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EXECUTIVE (or PUBLISHABLE) SUMMARY

A novel DeepU method of deep geothermal boreholes drilling requires a combination of laser and cryogenic technologies. The cryogen, namely cold nitrogen in liquid or supercritical state must be delivered down the borehole with a very limited heat gains. Additionally the nitrogen transfer system must be composed of fast demountable segments guaranteeing very limited heat transfer, mechanical robustness and fast coupling of the segments. WUST defined thermal and mechanical requirements of cold nitrogen transfer system and conceptualized its design. The design makes use of commercially available thermal insulation solutions and unique, developed by WUST, coupling concept. It will be verified by numerical modelling and prototyping.