DeepU

DELIVERABLE D1.2

Report on the final design and material selection for the 3-forld drill string

Lead Beneficiary: Prevent

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Dissemination Level

PU	Public, fully open	
SEN	Sensitive - limited under the conditions of the Grant Agreement	X
CI	EU classified - RESTREINT-UE/EU-RESTRICTED, CONFIDENTIEL-UE/EU-CONFIDENTIAL, SECRET-UE/EU-SECRET under Decision 2015/444	

Report on various liquid and cryptogenic gases suitable for laser-beam drilling

DeepU

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ABBREVIATIONS AND GLOSSARY OF ACRONYMS

Acronym	Extended definition
API	American Petroleum Institute
CA	Consortium Agreement
D	Deliverable
DCM	Dissemination and Communication Manager
D&C	Dissemination and Communication
EC	European Commission
EM	Exploitation Manager
EP	Exploitation Plan
GA	Grant Agreement
HE	Horizon Europe
IPR	Intellectual Property Rights
M	Month
PC	Project Coordinator
PDC	Polycrystalline diamond compact
PDEC	Plan for Dissemination and Exploitation including Communication activities
SC	Steering Committee
VRE	Virtual Research Environment
WP	Work Package

PUBLISHABLE SUMMARY

Prevent has led the development of an innovative drill string system designed to advance the efficiency and sustainability of deep drilling applications using a laser beam as energy source. The project focused on integrating cutting-edge materials and novel design concepts to enable the safe and stable transport of cryogenic fluids and the precise guidance of laser beams, addressing the unique challenges of this non-contact drilling technology.

The team explored multiple design iterations, overcoming issues such as thermal expansion, material compatibility, and operational efficiency amongst others in handling and connecting single drill string segments. The final design features a robust three-pipe system that ensures optimal thermal insulation, mechanical stability, tightness at high pressures and performance under extreme conditions at large depths. Laboratory tests and simulations validated the system's feasibility and reliability, forming a strong foundation for future steps in the development of the technology.

In addition, Prevent investigated lightweight, durable alternatives to traditional materials, particularly carbon fiber composites. These materials offer significant benefits, including reduced weight, enhanced corrosion resistance, and improved operational flexibility, presenting possibilities for future developments.

This deliverable represents a key milestone in Prevent's mission to innovate in the field of sustainable energy exploration.