DELIVERABLE D6.2

Production of leaflet and brochure

Lead Beneficiary: CNR

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Dissemination Level

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

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Document History

Version	Date	Authors	Description
1	30/05/2022	A. Manzella (CNR)	Creation of the document
2	31/05/2022	E. Di Sipio (UNIPD)	Revision, Final document

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1. Executive Summary

This document describes the leaflet and brochure prepared for the project at the initial phase of the activity.

2. The Leaflet

The leaflet is conceived as a trifold informative and promotional publication made of a single sheet of paper in A4 format. The outer sheet contains information about the project title and duration, the funding program, the European partners and the coordinator (Fig.1). In the inner sheet, a synthetic description of the DeepU project and its objectives is available (Fig.2).

3. The brochure

The brochure is a short, printed and half fold document in A3 format, containing descriptive material about the project. The front and back cover page contains the project branding, title and website reference and the partner logo with information about each partner and their role in the project, respectively (Fig.3). The inner pages contain images showing some of the main activities, devices, and facilities of the DeepU Project (Fig.4).

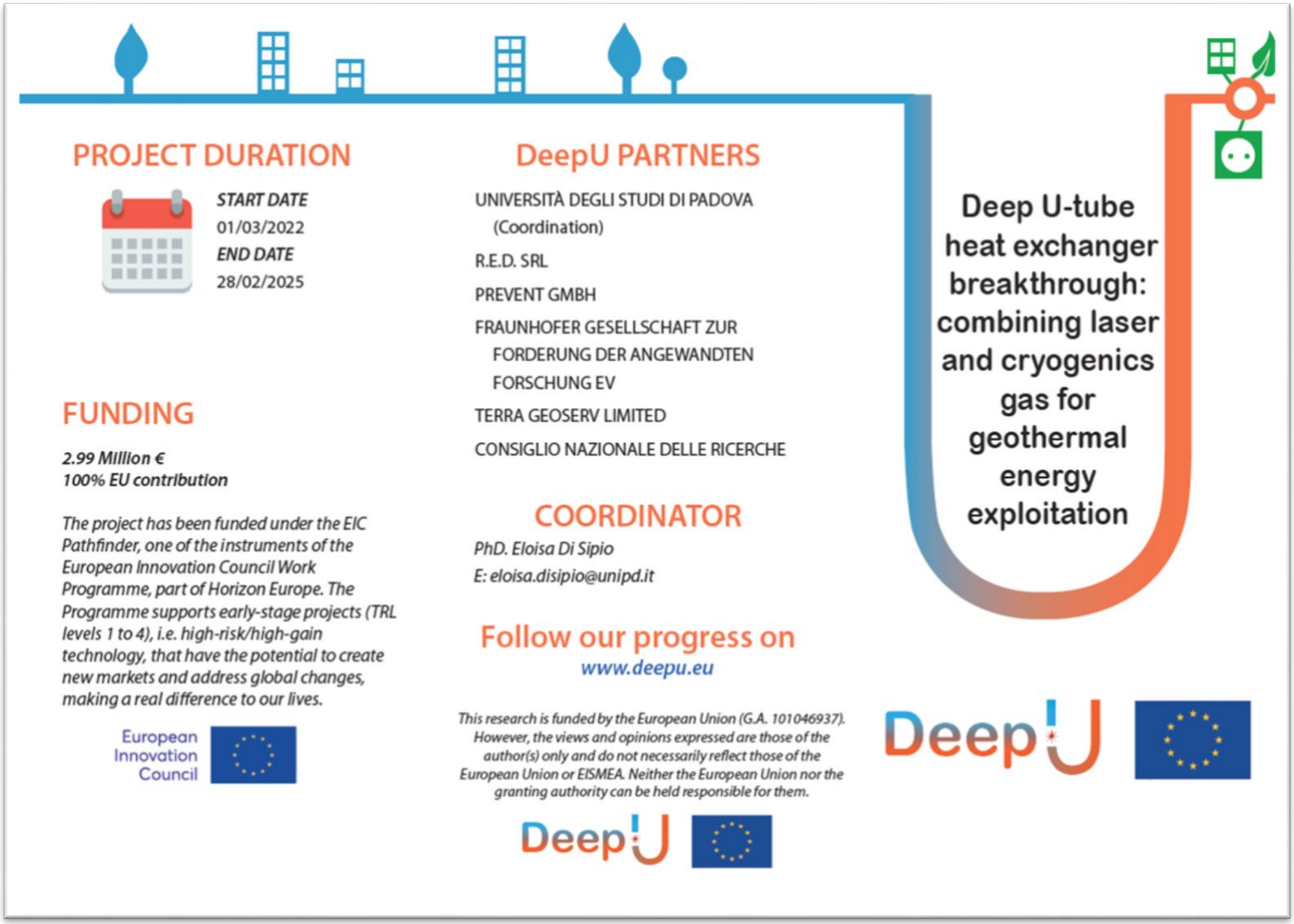


Figure 1: Leaflet outer sheet

Figure 2: Leaflet inner sheet

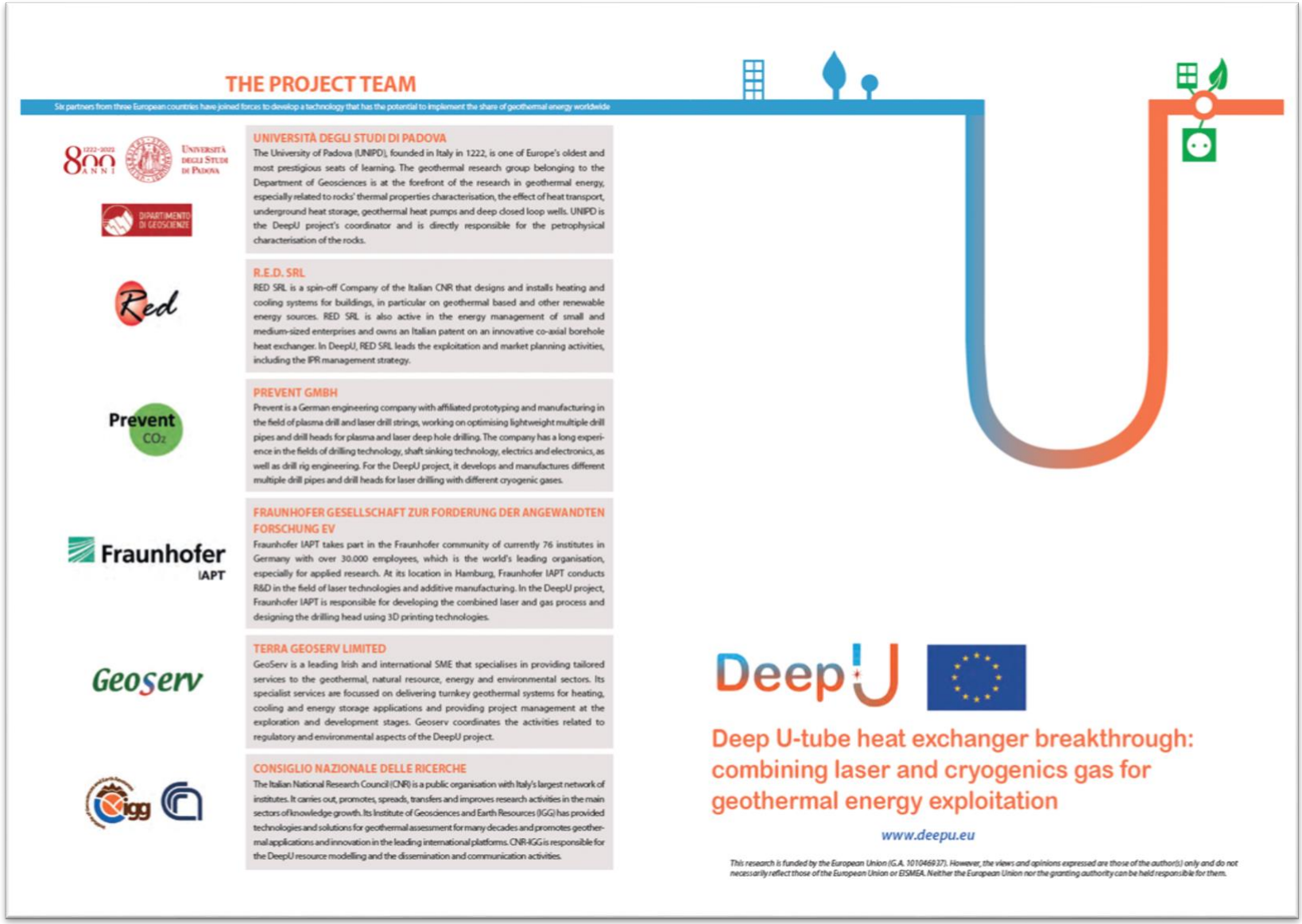
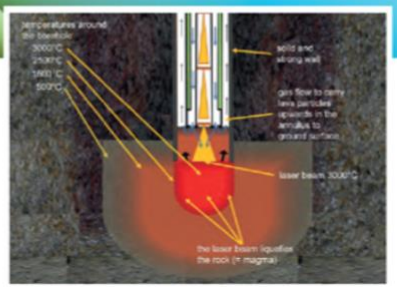


Figure 3: Brochure front and back cover pages

INNOVATIVE DRILLING TECHNOLOGY

What happens to a rock, even the hardest, if a high-temperature laser melts it and then a cryogenic gas suddenly cools it?
Vitrified, waterproof, non-cracked borehole surfaces are expected.
The resulting glazed layer on the borehole walls acts as a casing so that a deep heat exchanger is ready immediately after drilling

In the DeepU concept, a laser drill-head is combined with special drill strings to sustain the coupled action of laser and cryogenic gas. The fine particles are transported to the surface in the gas stream via the earth tube required for the geothermal heat exchanger. Specific temperature control analysis and innovative laser lenses convey the heat and sustain multilateral drilling. In addition, gases have to be kept cryogenic over a long distance. These innovations guarantee the liquefaction and vitrification of the rocks from the ground surface to significant depths.



INCREASED DRILLING SPEED

The rate of penetration (ROP) should be increased up to 20 to 30 meters per hour, increasing by a great far the drilling speed of traditional drilling methods (i.e. ten times that of rotary methods, reaching max 1-2 m/h in hard rock).

Laboratory tests will prototype the concept. Drilling experiments in a box of about 250 m³ filled with different rock types will validate and refine the technology. The petro-thermo-mechanical phenomena affecting different rocks will be analysed, and the borehole wall vitrification and integrity will be assessed.

THE DeepU PROJECT CONCEPT

Increasing accessibility of deep geothermal resources for low carbon heating and power generation is a fundamental requirement to accelerate the development of decarbonised and indigenous energy supplies in Europe.
Geothermal technologies provide baseload, indigenous and dispatchable renewable power and heat for space heating and industrial applications throughout the EU. However, besides shallow geothermal heat exchangers used in combination to heat pumps for heating and cooling applications, current geothermal development is limited to accessing water-bearing rocks or creating cracks or fissures to circulate and heat water at depth. The economic viability of existing technologies depends on favourable subsurface conditions to facilitate fluid circulation and on the cost of well drilling and completion. The latter represents over 55% of total project costs.

DeepU can potentially disrupt the geothermal industry by offering a substantial reduction of well drilling costs to deliver deep heat exchange systems.
Since the underground heat is transported by a secondary fluid circulating in deep, closed-loop systems, the high-risk innovation concept of DeepU has the potential to make **geothermal energy systems accessible anywhere** in a targeted and demand-oriented manner, offering a complementary approach and an alternative solution to traditional geothermal energy storage and production.

The DeepU solution will decentralize the power supply also in areas where this is currently deemed uneconomic, to significantly contribute to the energy sector's decarbonisation.

MARKET ANALYSIS FOR A SUSTAINABLE DEPLOYMENT

The project will analyse the exploitation potential and economics of the developed drilling technology utilising numerical simulations calibrated by the laboratory data. In addition, it will assess the legislative aspects and environmental, health and safety (EHS) standards related to the proposed solution. An EHS risks assessment comparing DeepU technology to conventional deep drilling will be performed based on the laboratory results.

Figure 4: Brochure inner pages