Information on each selected project

WP 3 – Delivery number D3.6 – 1st Call

Desember, 2018

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GEOTHERMICA D3.6

Sigurður Björnsson, Steinunn S. Jakobsdóttir

RANNIS

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GEOTHERMICA Office,

Orkustofnun, Grensásvegi 9, 108 Reykjavík

Tel: +-354-569 6000,

Email: os@os.is

Website: http://www.geothermica.eu/

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Executive summary

The overall aim of the GEOTHERMICA project is to accelerate the deployment of geothermal energy in Europe by pooling national and EC funds for research and innovation to fund projects focusing on improving business cases for geothermal energy and establishing a long-lasting strategic collaboration of national geothermal research and innovation program owners and managers of the GEOTHERMICA consortium.

In the first call 8 projects were funded, four Type A, large trans-national demonstration projects with maximum funding of €10 million per project, and four Type B; smaller trans-national research and innovation projects with maximum funding of €2 million per project.

Descriptions of these projects is found at GEOTHERMICA website - http://www.geothermica.eu.

The website is described in this report.

Acknowledgements

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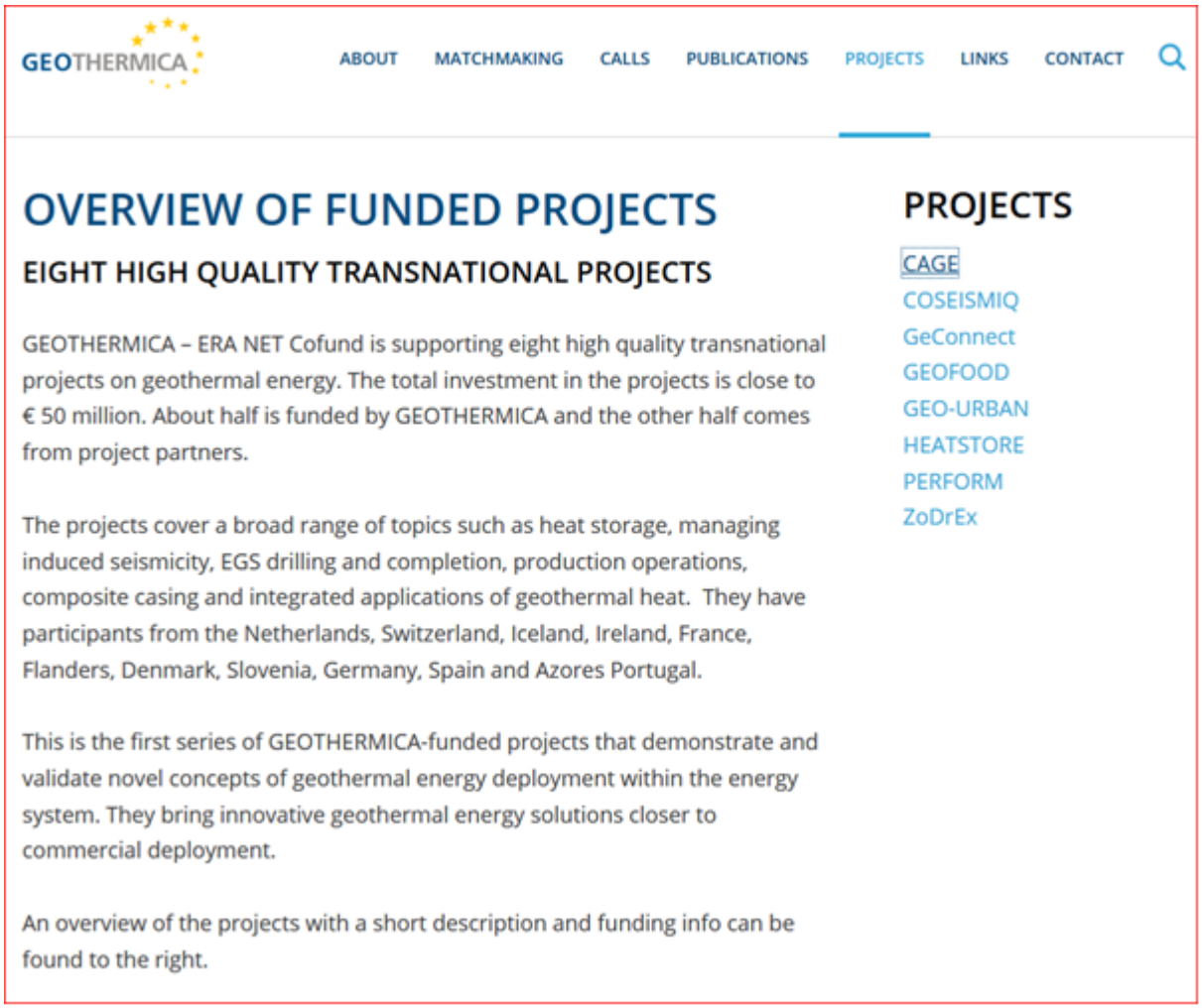
Table of Contents

1 Introduction

The first joint call of GEOTHERMICA resulted in eight grants awarded to four type A projects and four type B projects. Deliverable D3.6 is a web-page with information on each selected project: http://www.geothermica.eu/projects/. This deliverable (D3.6) is shortly described in this report.

2 Information found on the web-page

The first page when entering opening the link above is the overview page:



In the menu to the right on the page there is a direct link to the projects. Below there are snapshots of the pages.

2.1 HEATSTORE

HEATSTORE

Thermal energy storage technologies need to be developed and become an integral component in the future energy system infrastructure to meet variations in both the availability and demand of energy. The main objectives of this project are to lower the cost, reducing the risks and to optimize performance of high temperature (−25 to −90°C) underground thermal energy storage technologies by demonstrating 6 distinct configurations of heat sources, heat storage, and heat utilization. Technical, economic, environmental, regulatory and policy aspects will be addressed that are necessary to support efficient and cost-effective deployment in Europe. The project will stimulate fast-track market uptake in Europe promoting development from demonstration phase to commercial deployment within 2 to 5 years on the European market and provide an outlook towards utilization of full potential in 2050.

PROJECTS

CAGE
COSEISMIQ
GeConnect
GEOFOOD
GEO-URBAN
HEATSTORE
PERFORM
ZoDrEx

Institution/enterprise	Country
TNO - Nederlandse organisatie voor toegepast natuurwetenschappelijk onderzoek	Netherlands
Energie Wasser Bern	Switzerland
SIG	Switzerland
IF Technology	Netherlands
KWR Watercycle Research Institute	Netherlands
ECW Geomanagement BV	Netherlands
University of Geneva	Switzerland
Eidgenössische Technische Hochschule Zurich	Switzerland
University of Neuchatel	Switzerland
University of Bern	Switzerland
BRGM	France
Storengy	France
Bochum University of Applied Sciences / International Geothermal Centre	Germany
GEUS	Denmark
PlanEnergi	Denmark
VITO	Belgium
University of the Azores	Portugal
Reykjavik Energy	Iceland
delta-h Engineering GmbH	Germany
Noda GmbH	Germany
SPIE Belgium	Belgium
Kempens Warmtebedrijf	Belgium
Universitat Politécnica de Catalunya	Spain
Netherlands Institute of Ecology	Netherlands

	Geothermica financing	Total cost	Own financing
CAGE - Total financing	**8.305.268**	**16.265.971**	**7.960.703**

2.2 PERFORM

PERFORM

The objective is to improve geothermal plant performance in order to increase energy output and provide economic feasibility to current and future geothermal projects. Existing geothermal plants still face a large variety of operational problems caused by flow obstructions and inefficient injection strategies. The project plan is to develop a collective knowledge base by aggregating data and experiences from a range of geothermal doublets at multi-national level. Demonstration of cost-efficient, next-generation technologies and methods (cation-, particle filters, CO2-injection, thermal stimulation) will enable the reduction of obstructive elements and resistance to fluid injection. Predictive modelling of physical and chemical processes will permit long-term doublet performance projection. Optimization strategies will be undertaken at demonstration sites to ensure maximum energy output.

PROJECTS

CAGE
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GeConnect
GEOFOOD
GEO-URBAN
HEATSTORE
PERFORM
ZoDrEx

Institution/enterprise	Country
Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek	Netherlands
Danmarks og Grtfnlands Geologiske Unders0gelse	Denmark
FORCE Technology	Denmark
HelmholzZentrum Potsdam Deutchesgeoforschungszentrum	Germany
HYDROISOTOP GmbH	Germany
Ammerlaan Geothermie B.V.	Netherlands
Greenwell Westland Bv.	Netherlands

	Geothermica financing	Total cost	Own financing
PERFORM - Total financing	**2.236.825**	**3.011.717**	**774.892**

2.3 ZoDrEx

ZODREX

ZoDrEx aims at demonstrating drilling, completion and production technologies increasing technical and economic successes of geothermal projects. ZoDrEx will demonstrate that:

1. Percussion drilling can perform at high deviation in crystalline rock, and lead to substantial cost reduction.
2. Zonal isolation is key to EGS stimulation and efficient technology selection is possible. ZoDrEx will contribute to developing robust zonal isolation products.
3. Through automation, better corrosion protection, and monitoring, EGS plant's operation can be optimized while ensuring the safety of the workers and environment. 10 partners from DK, F, DE, E and CH, including 5 industry leaders, 3 engineering organizations, and 2 academic research organisations are gathered within ZoDrEx to deliver the required low risk engineering and innovative solutions to access deep geothermal resources.

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Institution/enterprise	Country
Geo-Energie Suisse AG	Switzerland
RWTH Aachen	Germany
H. ANGER'S SÖHNE Bohr- und Brunnenbauges. mbH	Germany
SIRIUS-ES	Germany
GZB - International Geothermal Centre	Germany
ES-Géothermie	France
CETIM-CERMAT	France
CSIC Consejo Superior de Investigaciones Cientificas	Spain
Welltec	Denmark
ETH Zurich	Switzerland

	Geothermica financing	Total cost	Own financing
ZoDrEx - Total financing	**2.860.282**	**4.890.706**	**2.030.424**

2.4 CAGE

CAGE

CAGE is a development and demonstration project of several cost-saving and output-improving installation technologies. The objective is to demonstrate a new GE concept, suitable for limestone areas and target depths of 1 to 2.5 km. The demonstration contains the following innovations:

- Crane-based drilling
- Enhanced Casing Installation (ECI / ECCI) technology (Casing While Drilling)
- Lightweight and corrosion resistant High Strength Composite Casing (HSCC)
- Acoustic Multi Sensor Parameter Analysis (MSPA) supported Radial Drilling
- Airlift technology to replace the costly Electrical Submergible Pump

CAGE has three main work packages:

1) preparatory studies (geology, well design, surface installations, business case, etc.)
2) technology demonstration (see above) @ real location
3) the development of the full composite mechanical connection (major improvement of ECCI).

PROJECTS

CAGE
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Institution/enterprise	Country
Akiet BV	Netherlands
Gipmans	Netherlands
Huisman Well Technology BV	Netherlands
Geothermie Zentrum Bochum	Germany
VITO (Vlaamse Instelling voor Technologisch Onderzoek)	Belgium
Radial Drilling Europe BV	Netherlands
Nederlandse organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek	Netherlands
Geoop Denmark	Denmark
Thomas More Kempen	Belgium

	Geothermica financing	Total cost	Own financing
CAGE - Total financing	**5.834.888**	**13.457.698**	**7.622.810**

2.5 COSEISMIQ

COSEISMIQ

This GEOTHERMICA research, innovation and demonstration project (requested budget: 1.14M Euro) brings together a small team of the most experienced operators of geothermal projects and leading scientists from Switzerland, Germany and Iceland. We will improve and validate the advanced technologies for monitoring and controlling induced seismicity that have been developed and coded in the past three years. These technologies are now ready to be used as a data-driven, adaptive decision support tool during industrial applications, the core objective of COSEISMIQ. We will demonstrate the technology (TRL 6+) as part of a commercial, multi-well application (CRI 3-4). We choose Iceland as the demonstration site because here conditions are ideal: there are many existing and commercially successful geothermal projects and induced seismicity is common.

PROJECTS

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ZoDrEx

Institution/enterprise	Country
Swiss Seismological Service, ETH Zurich	Switzerland
Iceland GeoSurvey (ÍSOR)	Iceland
GeoEnergie Suisse AG	Switzerland
Reykjavik Energie	Iceland
Dublin Institute for Advanced Studies	Iceland
GFZ German Research Centre For Geosciences	Germany

	Geothermica financing	Total cost	Own financing
COSEISMIQ - Total financing	**1.148.958**	**2.479.458**	**1.330.500**

2.6 GeConnect

GECONNECT

GeConnect aims at increasing the reliability of the downhole construction of geothermal wells beyond the state of the art using flexible couplings (patent filed 19th of December 2016, international publication number WO 2017/103950 A1). The flexible couplings are able to minimize the risk of casing failures, e.g. casing collapse due to high axial compressive stresses and casing/coupling failure due to axial tensile stresses or cement failures due to axial forces applied onto the cement.

In GeConnect, the integrity of cemented annulus and the casing using flexible couplings will be tested in-situ in a surface experiment.

PROJECTS

CAGE
COSEISMIQ
GeConnect
GEOFOOD
GEO-URBAN
HEATSTORE
PERFORM
ZoDrEx

Institution/enterprise	Country
ÍSOR - Iceland GeoSurvey	Iceland
GFZ - German Research Centre for Geosciences	Germany
TNO	Netherlands
Landsvirkjun	Iceland
HS Orka	Iceland

	Geothermica financing	Total cost	Own financing
GeConnect - Total financing	868.891	1.196.126	327.235

2.7 GEO-URBAN

GEO-URBAN

The ability to use geothermal resources to generate heat in urban areas where the demand is greatest has the potential to significantly reduce our reliance on fossil fuels and to support sustainable energy policies. Potential deep geothermal resources in challenging, lower-enthalpy EU settings remain poorly understood and largely untapped. The GEO-URBAN project aims to explore the potential for low enthalpy geothermal in urban environments. The project will focus on two target locations – Dublin, Ireland and Vallès, Spain – and will provide a feasibility analysis for the commercial development of deep geothermal resources in these regions. The overall objective of GEO-URBAN is to identify the geothermal resources available in two challenging urban locations and to demonstrate a commercialization strategy that has the potential to be adapted in other similar locations.

PROJECTS

CAGE
COSEISMIQ
GeConnect
GEOFOOD
GEO-URBAN
HEATSTORE
PERFORM
ZoDrEx

Institution/enterprise	Country
Gavin and Doherty Geosolutions Ltd.	Ireland
Universitat de Barcelona	Spain
Dublin City Council	Ireland
University College Dublin - Irish Centre for Research in Applied Geosciences	Ireland
Geotermisk Operatorselskab	Denmark
Dublin Institute for Advances Studies	Ireland
Barcelona Supercomputing Center	Spain
Geothermal Association of Ireland	Ireland
Spanish Geothermal Technology Platform	Spain
Institut Cartográfic i Geologic de Catalunya	Spain

	Geothermica financing	Total cost	Own financing
GEO-URBAN - Total financing	**539.275**	**737.233**	**197.958**

2.8 GEOFOOD

GEOFOOD

Food production in Europe requires further steps in reducing the carbon footprint. This project showcases the opportunities of direct use of geothermal energy to increase food production in highly productive circular systems. The objectives and challenges are to 1) design and optimize a demonstration plant in Iceland with direct use of geothermal energy for innovative sustainable circular food production techniques, built on technological advances in aquaponics (the combination of aquaculture and hydroponics), inclusion of new species, product diversification, tourism related edutainment and business development; and 2) design and build a research system to optimise energy configuration in The Netherlands at the research facilities of Wageningen UR. Furthermore, the aim is to disseminate the results to other geothermal areas in Europe and worldwide.

PROJECTS

CAGE
COSEISMIQ
GeConnect
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HEATSTORE
PERFORM
ZoDrEx

Institution/enterprise	Country
Samrækt efh	Iceland
Wageningen UR	Netherlands
University of Iceland	Iceland
LandIngAquaculture	Netherlands
Ammerlan The Green Innovator	Netherlands
University of Maribor	Slovenia
Municipality of Brezice	Slovenia

	Geothermica financing	Total cost	Own financing
GEOFOOD - Total financing	**1.249.204**	**1.749.656**	**500.452**

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3 Closing remarks

The web-pages described in this report covers the information already available on the GEOTHERMICA website. In the description of the deliverable patents, filling, etc. is also mentioned but none of this is actual at the time of writing this report.

GEOTHERMICA

GEOTHERMICA Office
Orkustofnun - Grensásvegur 9 - 108 Reykjavik - Iceland - Tel. +354 569 6000 - Fax: +354 568 8896

www.geothermica.eu