

# DARLINGe - DANUBE REGION LEADING GEOHERMAL ENERGY



**Interreg**



EUROPEAN UNION

Danube Transnational Programme

DARLINGe



# Project Overview

The DARLINGe project (Danube Region Leading Geothermal Energy) was granted funding in the first Call of the **Danube Transnational Programme (DTP)** with an overall budget of 2,525,760.7 €. It is co-funded by the European Regional Development Fund (1,612,249.99 €) and by the Instrument for Pre-Accession Assistance II (534,646.6 €).

The project addresses the specific objective **“Improve energy security and energy efficiency”**, within the thematic priority **“Better connected and energy responsible Danube region”**. It aims to contribute to energy security and energy efficiency in the Danube Region by raising awareness for the deep geothermal energy resources and by improving the efficient use of the entire range of the temperatures of extracted geothermal water.

## Participants

**15 partners and 7 Associated Strategic Partners (ASP) from six countries of the Danube Region:**

### **BOSNIA AND HERZEGOVINA:**



Federal Institute for Geology – Sarajevo



Geological Survey of the Republic of Srpska-Zvornik

### **CROATIA:**



Geological Survey of Croatia



Zagorje Development Agency Ltd.



Croatian Energy Market Operator Ltd. (ASP)



Ministry of Economy, Entrepreneurship and Crafts (ASP)

### **HUNGARY:**



Mining and Geological Survey of Hungary MBFSZ (Leader)



Mannvit Planning and Consulting Limited Liability Company



InnoGeo Research and Service Non-profit Public-benefit Limited Liability Company



Ministry of Foreign Affairs and Trade



Ministry for Innovation and Technology (ASP)

### **ROMANIA:**



Geological Institute of Romania



S.C. Terratechnik S.R.L.



AGENȚIA NAȚIONALĂ PENTRU RESURSE MINERALE

National Agency for Mineral Resources (ASP)

### **SERBIA:**



University of Belgrade - Faculty of Mining and Geology



Municipality of Bogatić



Municipality of Sremski Karlovci

### **SLOVENIA:**



Geological Survey of Slovenia



Local Energy Agency Pomurje



Ministry of Infrastructure - Energy Directorate (ASP)



Association of Municipalities and Towns of Slovenia (ASP)



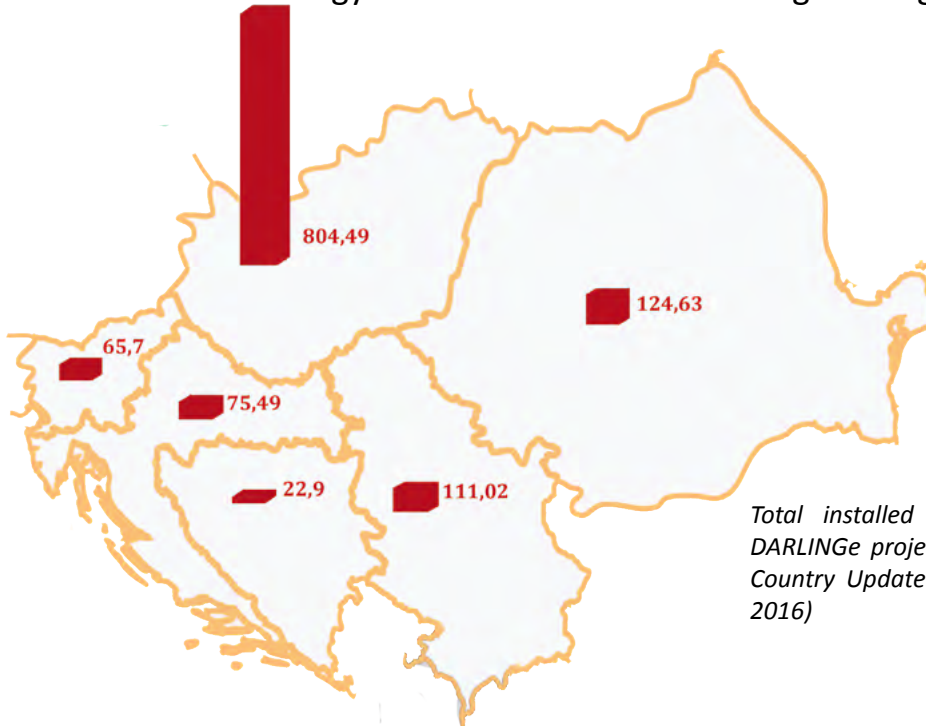
City Municipality of Murska Sobota (ASP)

## Some geothermal energy facts and figures

In all six project countries, geothermal water (manifested as springs at some places) has been known and used since Roman times in thermal baths. Systematic exploration and exploitation began in the 19th century and nowadays geothermal water is being used - beyond the traditional balneology and recreation -

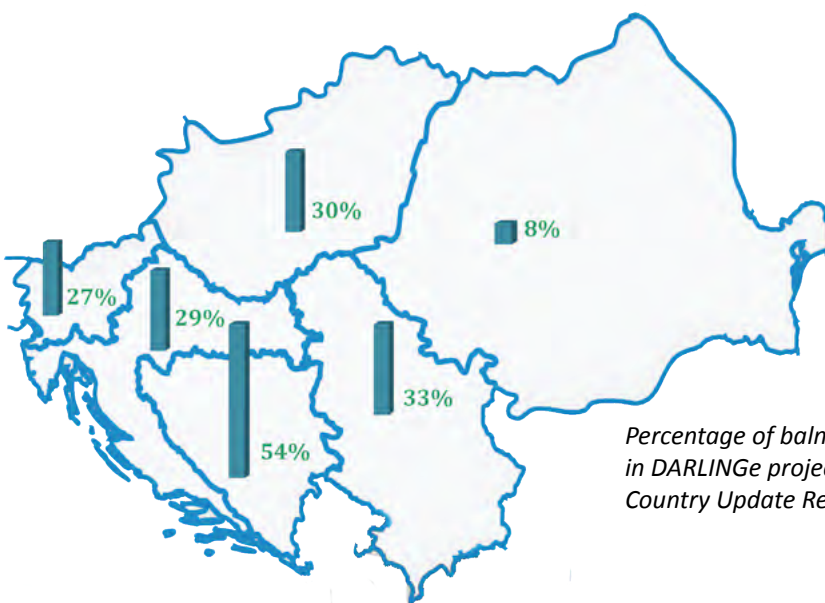
also in district heating, individual heating, agriculture (greenhouses) and some industrial processes (mostly in the leather and textile industry).

At country level, the installed geothermal capacities vary greatly between the participating countries, the highest use being in Hungary.



Total installed geothermal use capacities (MWth) in DARLINGe project countries, situation 2014-2015 (source: Country Update Reports, European Geothermal Congress 2016)

Not only the installed geothermal capacities are very different, but also the fields of utilization. In the majority of the countries, around one-third (up to 54% for Bosnia and Herzegovina) of geothermal water is still used for balneology and in spas, but these figures refer to the whole territory of the countries. In Romania the percentage is lower (8%), but this is due to newly installed district heat systems in Oradea and Beiuș, outside the project area.



Percentage of balneology use, out of total geothermal use capacities in DARLINGe project countries, situation 2014-2015 (source: Country Update Reports, European Geothermal Congress 2016)

# Project area

DARLINGe project area covers around 95,000 km<sup>2</sup>, where there are two types of geothermal aquifers, hosted in multi-layered porous rocks in sedimentary basins, and in fissured, fractured and karstified rocks in their basement. The temperatures vary between 20°C and 90-110°C. Being lower than 150°C, the geothermal water cannot be efficiently used for electricity production, however it is convenient for direct use purposes, such as district heating systems and individual space heating, as well as for other agricultural/

industrial purposes. Thermal water with temperatures lower than 30°C are not the subject of DARLINGe project.

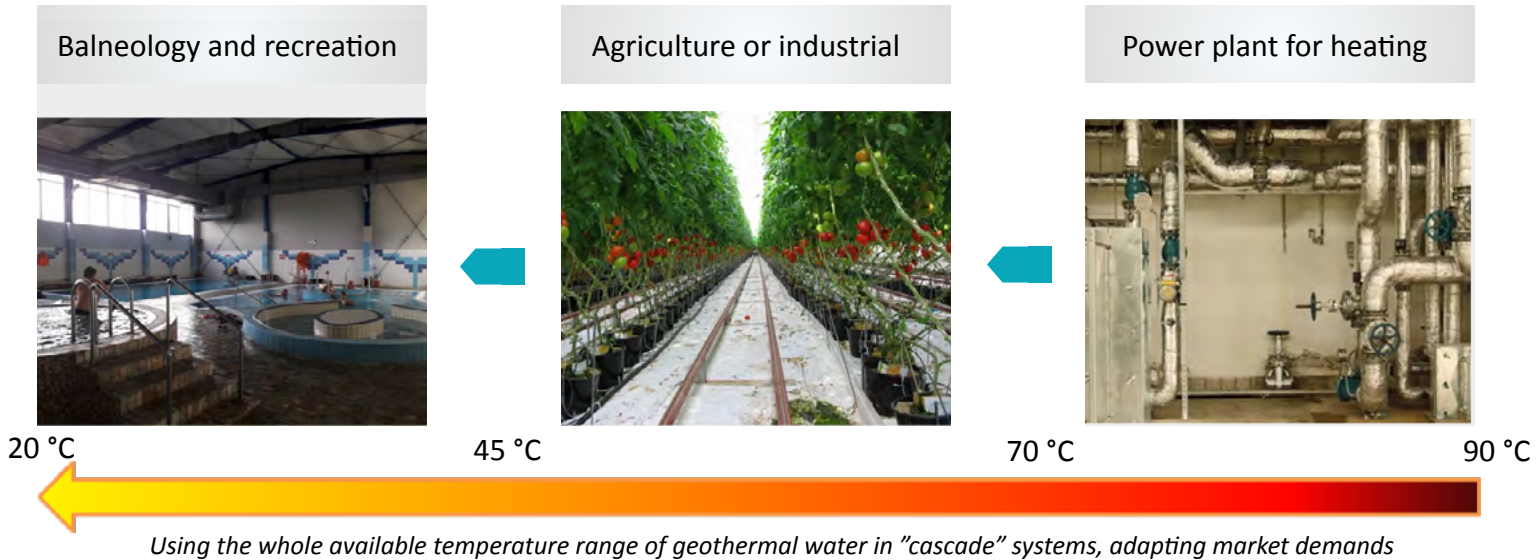
Within the project study area, three cross-border pilot areas were selected, where more detailed investigations will be carried out in order to test the developed methodologies. The westernmost pilot area covers the area between Croatia, Hungary and Slovenia, the southern one the area between Bosnia and Herzegovina and Serbia, while the third one is between Hungary, Romania and Serbia.



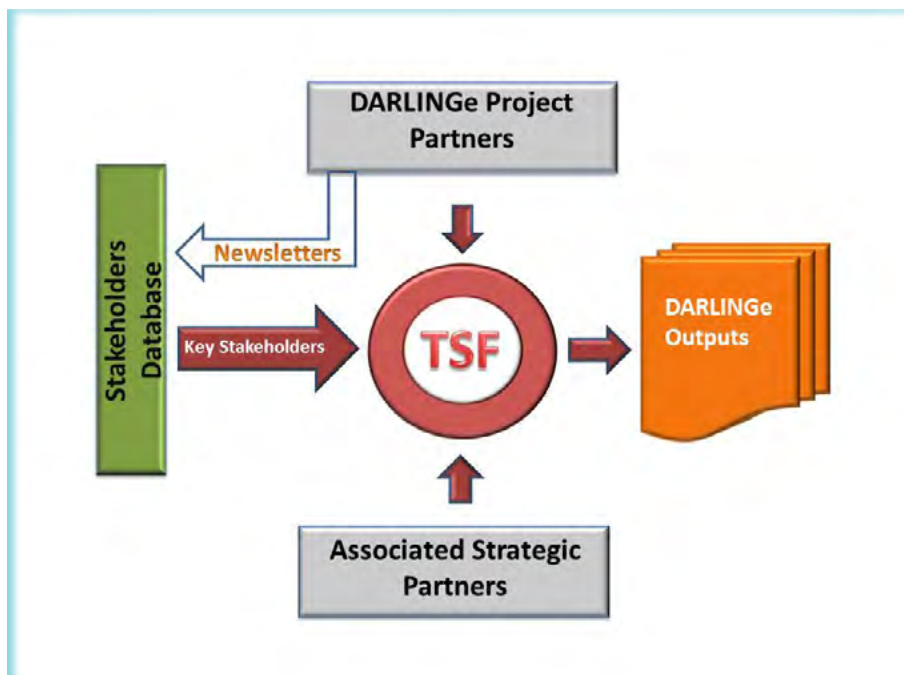
*DARLINGe study area and its three cross-border pilot zones*

# Project objectives

The project aims to **enhance the efficient use of deep and still untapped geothermal water** and to promote cascade utilization of the resources.



Growing the share of geothermal energy amongst the renewable energy resources in the region cannot be done without increasing the awareness of the stakeholders at local, regional and national levels. Accordingly, one of the most important activities of DARLINGe was to create an adequate stakeholder database encompassing contacts from the entire geothermal value chain (ministries, relevant authorities, agencies, project developers and operators, academia, research institutes, NGOs, municipalities, etc.). The database containing the relevant stakeholders of the 6 project countries was duly elaborated by the project partners and 2-3 representatives were selected from each country to take part in the **Transnational Stakeholders Forum (TSF)**. The TSF was set up to discuss with project partners and associated strategic partners (ASPs) the project outputs and progress



The first activity of DARLINGe was the organization of a training course for project partners, in order to achieve a common interpretation and knowledge level regarding the methodologies for geothermal resource assessments. This knowledge helped the members to carry out project activities such as:

- collecting the latest available information regarding geological, geochemical and geothermal parameters for the identification of favorable, but still unexploited areas (potential geothermal reservoirs) and their characterization;
- inventorying the status and current use of geothermal wells in the project area;
- identifying and analyzing best practices;
- performing a heat market analysis of the project area in order to match heat demands with available resources, including the review of national energy

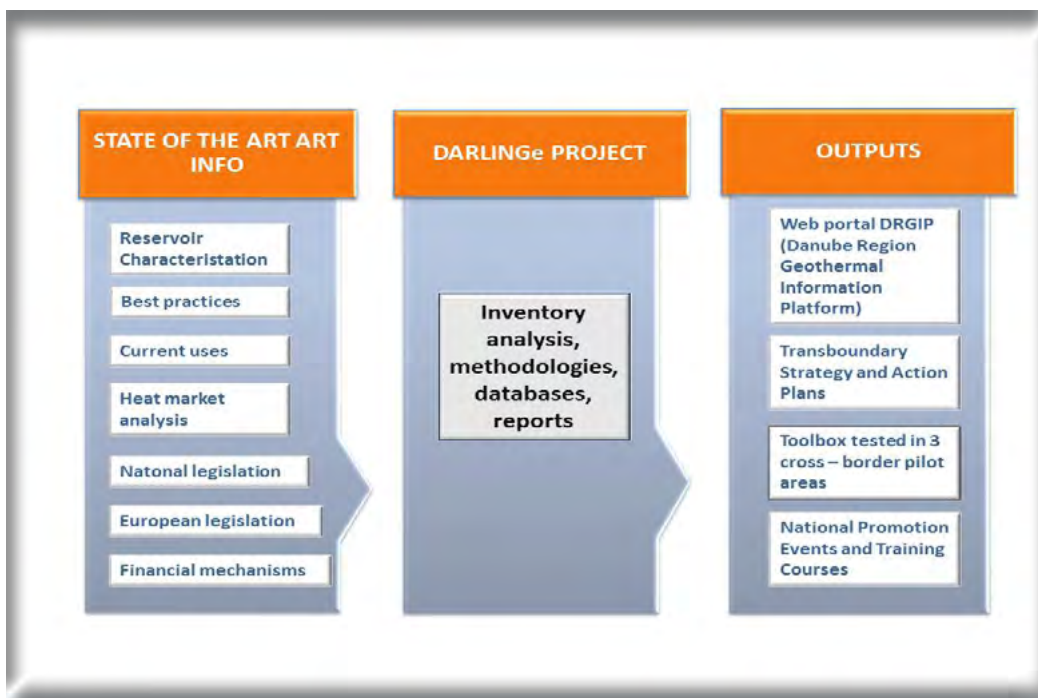
All these data and information are contributing to the elaboration of the following outputs:

> an interactive, user-friendly web application called Danube Region Geothermal Information Platform (DRGIP), which will allow users to visualize, select, search and download the requested information for the area of interest;

> a Transboundary Strategy and Action Plans which will be transmitted to decision-makers, in order to enhance the use of geothermal energy in the area without adversely

affecting the environment and/or jeopardizing the geothermal water resources of neighboring countries;

> a market-replicable tool-box consisting of three complementary modules for the sustainable management of deep geothermal resources (an independent, indicator-based benchmark evaluation of current uses, a decision tree to assist de-



policies and renewable / geothermal targets;

- collecting and analyzing all legislations related to exploration/exploitation of geothermal resources;
- summarizing all relevant EU legislation in the field of geothermal energy;
- identifying active financial mechanisms that support the development of geothermal applications in partner countries.

velopers, and a geological risk mitigation scheme to maximize the success rate of a geothermal well), which will be tested in the pilot areas;

> national promotion events and training courses for stakeholders to disseminate the results of the project and to raise awareness in the region regarding the geothermal energy potential.

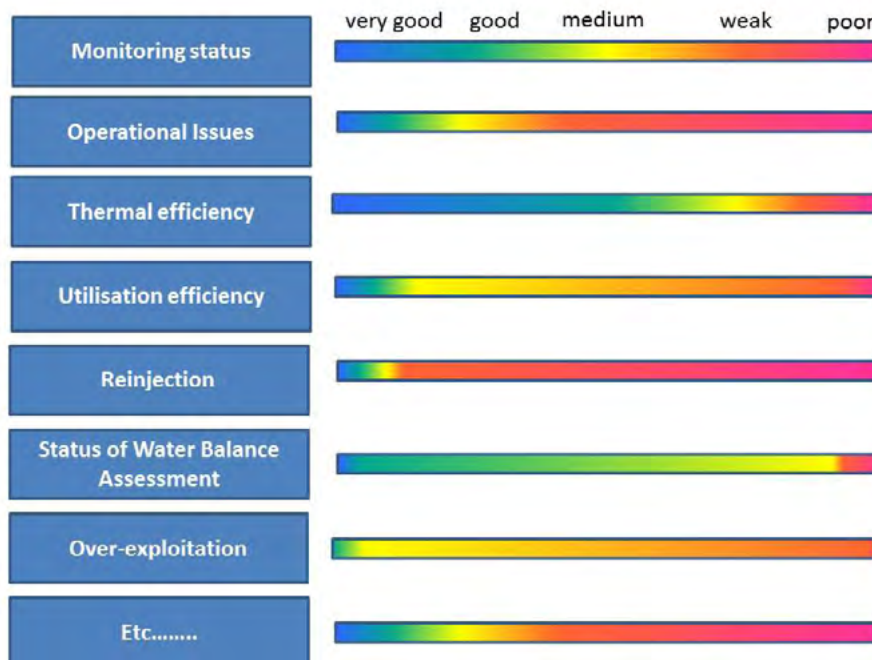
# New management tools

The tool-box encompasses the following three novel modules to be tested in the three cross-border pilot areas.

## **Benchmarking**

A detailed list of parameters from currently operating thermal water wells have been defined, which will serve as a basis for the elaboration of relevant indicators, calculated on the basis these parameters. The respective values belonging to each indicator will be ranged afterwards on a scale as good, medium or poor.

The purpose of this activity is to stimulate the users, regions to improve their respective activity (e.g. energy efficiency, monitoring, exploitation technology etc.) in order to achieve similar results as their neighbours exploiting the same aquifer, to whom they compare themselves.



*Various benchmarking indicators*

## **Geological risk mitigation scheme**

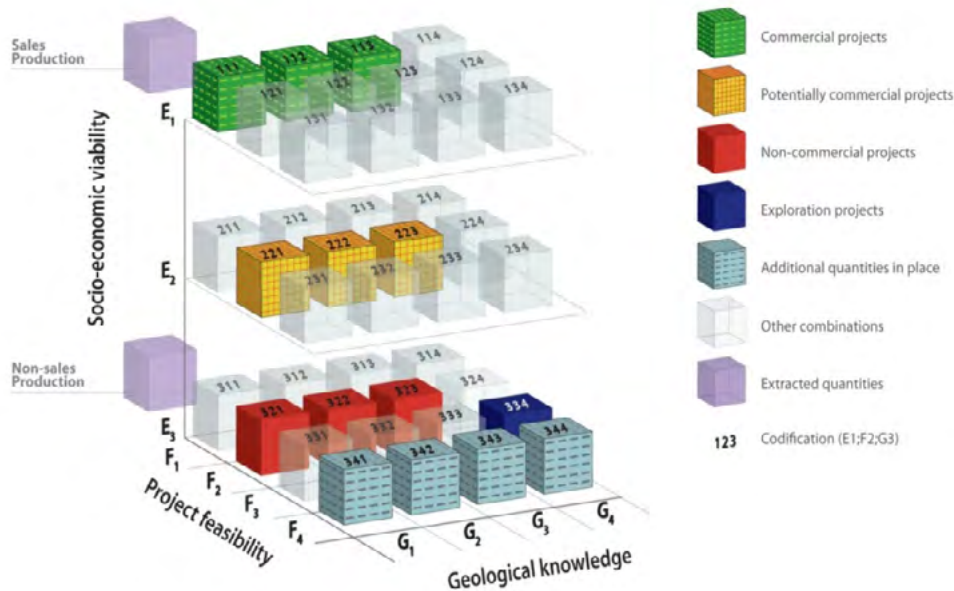
The scheme is a tool which provides a guideline about managing geological risks on a transparent and efficient way. On pilot areas, a theoretical geothermal project will be identified on a given location and a list of parameters needed for applying the geological risk mitigation scheme will be collected. The procedure of creating the scheme implies:

- Definition of damages, as unfavorable deviations from the expectations
- Defining the proof of a given damage
- Defining retrospectively the risk events and follow on events which might result in a given damage
- Definition of risk mitigation measures of risk events
- Defining amending activities
- Definition of timing when the given risk mitigation measure could be made
- Restructuring risk mitigation measures according to project phases

## Decision-tree

This module will apply the **UNFC-2009** (United Nations Framework Classification for Mineral Reserves and Resources 2009) classification scheme for selected projects in the pilot areas. The UNFC-2009 is a universally accepted and internationally applicable system in which mineral resources-reserves / fossil energy (in this case geothermal energy) quantities associated with a certain project are classified and reported on the basis of the three fundamental criteria of economic

and social viability (E), field project status and feasibility (F), and geological knowledge (G), using a numerical and language independent coding scheme. Combinations of these criteria create a three-dimensional system. Assessing various types of projects at different stages of their life-cycles (exploration, under development, in operation, expansion) will fill in the entire granularity of the UNFC-2009 scheme and will show projects the necessary steps for further developments.



*United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009*

## Conclusions

DARLINGe project, by means of its activities and outputs, aims to achieve a **change in attitude towards geothermal energy** in the region, by raising awareness on the advantages of geothermal heating,

spreading the application of energy efficient cascade utilization and by intensifying cooperation among key players of the geothermal sector, thus contributing to the decarbonisation of the heating sector.





# Danube Transnational Programme

A stream of cooperation

**Contact:**

<http://www.interreg-danube.eu/approved-projects/darlinge>

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