CENTRAL EUROPE
COOPERATING FOR SUCCESS.

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

This project is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF

Transenergy

Transboundary Geothermal Energy Resources of Slovenia, Austria, Hungary and Slovakia

A common geothermal information system in four countries of Central Europe

http://transenergy-eu.geologie.ac.at

Background and Challenge

Worldwide there is a growing need for the enhanced use of renewable energies due to the continuously increasing energy demand. This is underlined by the restricted reserves of fossil fuels and their uneven occurrences threatening the security of supply. Furthermore anthropogenic emission of carbon-dioxide resulting from the burning of oil, gas and coal affects the climate system of the Earth.

By fostering the sustainable utilization of geothermal energy in the western part of the Pannonian basin and its surroundings, TRANSENERGY project supports the serious international efforts to increase the proportion of renewables in the energy mix (e.g. Kyoto Protocol, EU COM[2006]848). Moreover it contributes to the Lisbon Strategy by introducing new implementations and potential investments in the geothermal energy sector leading to the increasing competitiveness of the region. The project results also supplement the Cohesion Policy by strengthening territorial cooperation among the participating countries/regions.

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Project Area

TRANSENERGY's final goal is to provide a user friendly, interactive web based decision supporting tool which transfers expert know-how of sustainable utilization of geothermal resources in the western part of the Pannonian basin.

Targeted stakeholders are primarily authorities and investors, who will get a regional evaluation of geothermal resources of the project area. Assessment will be done by various geological, hydrogeological and geothermal models at a supra-regional scale and on five selected cross-border pilot areas with different geothermal settings, where already existing utilization problems have been identified.

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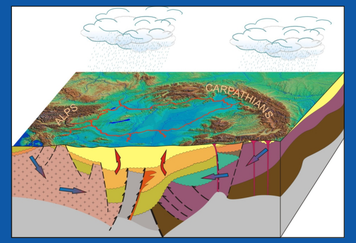
Transboundary Management

The Pannonian basin in Central Europe surrounded by the Alps and Carpathians is located on a characteristic positive geothermal anomaly with a geothermal gradient of about 45 °C/km.

TRANSENERGY addresses the key problem of using geothermal energy resources shared by different countries in a sustainable way. The main carrying medium of geothermal energy is thermal groundwater. Regional flow paths are strongly linked to geological structures that do not stop at state borders. Therefore only a transboundary approach and the establishment of a joint, multi-national management system may handle the assessment of geothermal potentials and give guidelines for a balanced fluid/heat production to avoid possible negative impacts (depletion, or overexploitation) in the neighboring countries.



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Main Outputs

- multilingual interactive geothermal web-portal containing a database linked to thematic maps, cross sections and models
- geological, hydrogeological and geothermal models for the supra-regional and pilot areas
- scenario models showing estimates on the potential and vulnerability of the cross-border geothermal systems for different extractions of thermal water/heat
- database of current geothermal energy users and production parameters, visualized on transboundary utilization maps
- database of authorities dealing with management and licensing of transboundary geothermal aquifers
- summary of actual legal and funding framework at the participating countries with emphasis on cross-border geothermal facilities
- strategy paper evaluating existing exploitation, future possibilities and recommendations for a sustainable and efficient geothermal energy production at the project area

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Organizations & Contacts

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Project duration: April 1, 2010-September 30, 2013

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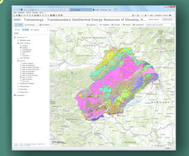
Website

Get more details on the TRANSENERGY Website

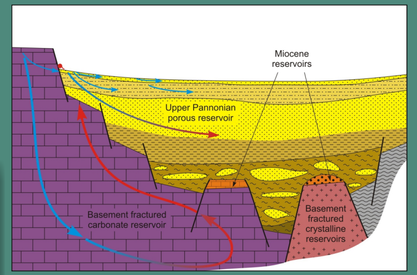
http://transenergy-eu.geologie.ac.at

the key for further information



Geothermal reservoirs

Geothermal reservoirs are hot and permeable rock volumes in the deep surface, from where heat can be economically exploited by use of a carrying medium, i.e. stored thermal ground water. Based on the integrated evaluation of geological, hydrogeological and geothermal conditions of the TRANSENERGY project area, 3 main types of potential reservoirs (basement, Upper Pannonian and Miocene) were outlined with different sub-categories related to the lithology of the rocks and their temperature intervals. These categories – together with other characteristics, i.e. depth of the reservoir, hydraulic connections, chemistry of fluids, aspects of reinjection – determine their potential for different types of utilization.



Basement reservoirs

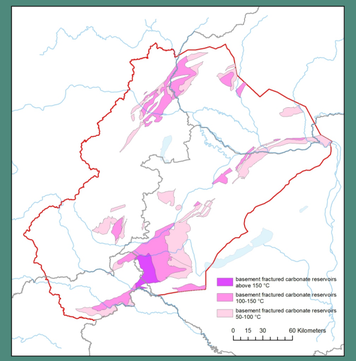
The basement rocks belong to a wide range of geological structures in the TRANSENERGY area. From a reservoir point of view, they can be classified as crystalline and carbonate rocks, of which the uppermost weathered, karstified 50 m zones are potential reservoirs due to an increased permeability. Furthermore, high temperature and high-pressure mixed steam-fluid systems may be explored along major fault-zones originated from bigger depths (>3000 m).

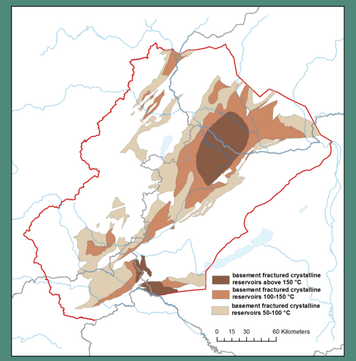
The temperature of the basement reservoirs exceeds 50 °C in most of the regions beneath all Neogene sub-basins, at a depth of 800-1500 m. Areas where temperature exceeds 100 °C have great extension too, especially in the central parts of the basins at a depth of 2000-5000 m, while regions with sub-surface temperature higher than 150 °C are restricted to basin interiors at a depth of 3000-6000 m.

Fractured crystalline reservoirs (in the Vienna basin locally siliciclastic sedimentary rocks) are usually closed structures with limited recharge, characterized by high salinity and Na-Cl-type fluids. Carbonate reservoirs may store fluids with different chemical composition, depending on their hydraulic connections to the regional flow systems.

The basement reservoirs have high utilization potential, ranging from direct heat to power generation (T > 150 °C). However, production/re-injection is limited to larger fracture zones with increased hydraulic conductivity.

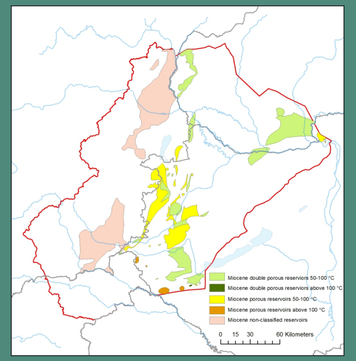
Basement reservoirs





Miocene reservoirs

Miocene reservoirs occur either on the basin margins, or in elevated position capping basement highs. They have two types: (1) shallow-marine clastic carbonates with double porosity and (2) porous sandy reservoirs. Both types have limited thickness (up to 100 m). On some areas the lithology cannot be defined unambiguously (unclassified type). Miocene reservoirs are generally semi-open, or closed structures, which determine the chemical character of the stored fluids (Ca-Mg-HCO3-, Na-HCO3- to Na-Cl-type, sometimes with extremely high total dissolved content). They are potentially suitable for balneology and direct heat applications, as well as combined heat and power where temperature exceeds 100°C. However the high dissolved content and small thickness may limit their utilization.



Upper Pannonian porous reservoirs

The Upper Pannonian porous sandy reservoirs form part of the several thousand meters thick Neogene basin fill complex. Areas, where temperature is at least 50 °C at their top extend on a large area at a depth below 500-1000 m. Usually they get direct recharge via the overlying sediments, resulting in low salinity, Na-Ca-HCO3-character of the stored thermal groundwater, forming part of the gravity-driven regional flow system. These reservoirs are potential targets for balneology and direct heat applications. Temperature exceeds 100 °C in smaller areas at a bigger depth (below 2000 m). Due to the deeper position, they contain rather stagnant water. The higher temperature makes them suitable for combined heat and power and direct heat applications.