

# The European Technology Platform on Renewable Heating and Cooling

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# The role of the SRA



Implementa  
tion plans

Key deliverable of  
TP's!



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SRA

Vision

European technology platforms (ETPs) were set up as industry-led stakeholder forums with the aim of defining medium to long-term research and technological objectives and developing roadmaps to achieve them.

Technology platforms have the primary objective of defining a coherent and unified approach to tackling major economic, technological or societal challenges of vital importance for Europe's future competitiveness and economic growth.

# Latest News

## Geothermal Strategic Research Agenda

- August – September 2011
- 02/09/2011: Validation workshop
  - new board of the Geothermal SRA
- November 2011 – January 2012
- Publication of the final Geothermal SRA

Geothermal SRA

board

SC

12

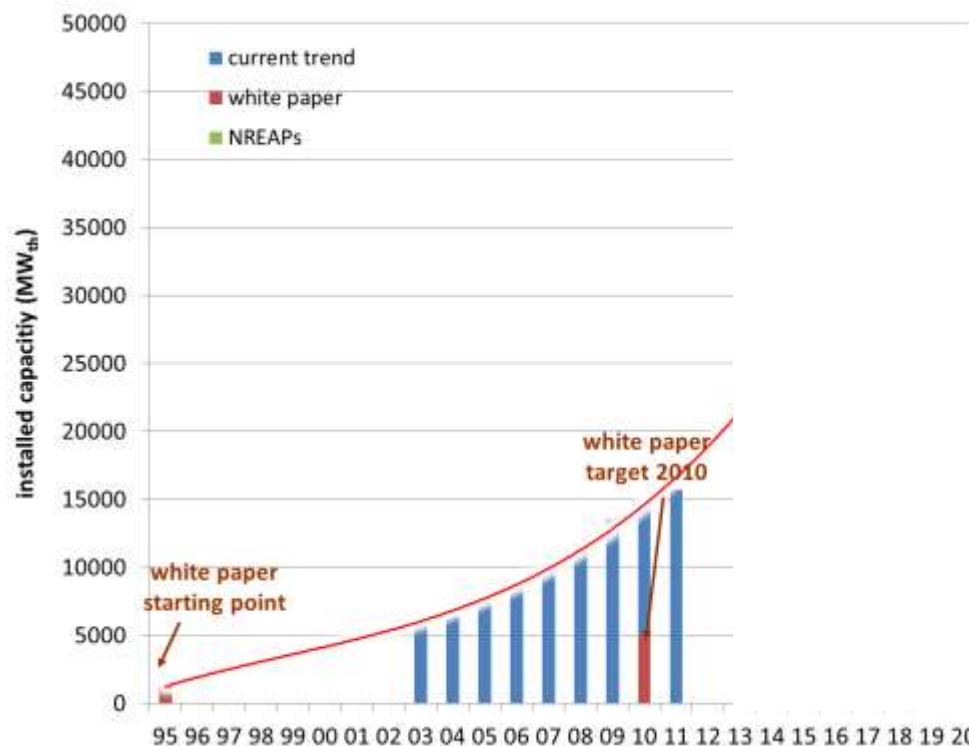
Strategic Research Priorities  
for Geothermal Technology

European Technology Platform on Renewable Heating and Cooling

**RHC** Renewable  
Heating & Cooling  
European Technology Platform

## GENERAL SUMMARY

1. Introduction to Geothermal Energy
2. Geothermal heating and Cooling : Vision 2020/2030
3. Shallow Geothermal
4. Deep Geothermal



# SHALLOW GEOTHERMAL HEAT PUMP SYSTEMS

## 3.1 Shallow geothermal systems

## 3.2 Underground system components and materials

## 3.3 Installation of underground heat exchangers

## 3.4 Integrated Design

## 3.5 Sustainability and environmental impact

## 3.6 Shallow geothermal heat pump systems in 2020

## SHALLOW GEOTHERMAL HEAT PUMP SYSTEMS

The topic	Potential R&D
<b>Underground components</b>	
<b>Underground installation</b>	
<b>Integrated design</b>	
<b>Sustainability Environmental impact</b>	

## Implementing Strategic R&D priorities : shallow

TERM 2011-2013:

- Better installation efficiency, reduced environmental impact and further increase of thermal efficiency of BHE systems (e.g. small borehole diameters, alternative installation techniques, application of new materials, ...)
- Improving the use of the storage function of the ground in the framework of smart electricity grids and smart thermal grids (e.g. intermediate depth, integrated design, ...)
- Understanding foundation heat exchangers (“energy piles”, slabs etc., tunnels...)
- Shallow geothermal in historical buildings

*Tools to design, optimise and monitor smart thermal grids*  
**=> Cross Cutting Panel**

# Strategic R&D priorities : shallow

Table 9 - Summary list of shallow geothermal research priorities and targets

TERM 2020/2030 and beyond:

	Short term (2020)	Medium term (post 2020)
Basic research	Improvement to BHE materials	New (plastic) materials for BHE with enhanced thermal conductivity
	Improvement to antifreeze agents	New environmentally benign heat transfer fluids with low freezing point, low viscosity and high specific heat capacity
	Better understanding of thermal impact in building elements used as ground heat exchanger	
	Environmental impact of shallow geothermal applications	
	Short term (2020)	
Applied research & development	Improvement of BHE design and construction	
	Improved grouting materials (sealing, thermal conductivity)	
	Mechanised and optimised drilling and installation technologies (incl. mechanised grouting, quality monitoring, etc.)	
	Standardised installation technology for building elements as ground heat exchangers	
	Further development of heat pipes as BHE	
	For open systems, improved well construction and completion, injection well control, water treatment	
	Improved methods for determining underground parameters (TRT, geophysics)	
	Integrated design and modelling tools	
Demonstration	Effect of open systems (groundwater) on hydrochemistry and microbiological composition of the subsurface	
	GSHP and UTES plants with improved efficiency in different climate and geology, including improved control strategies	
	Hybrid applications with integrated planning and operation control	
	Use the storage function of the ground in the framework of smart electricity grids and smart thermal grids	
	Collect and provide ground design data for closed and open systems in easily accessible geographical databases	



# DEEP GEOTHERMAL

## 1 Introduction

- 1.1 Development Objectives
- 1.2 Resource Environments
- 1.3 Scope of deep geothermal application

## 2 Research Priorities

- 2.1 Resource Assessment
- 2.2 Drilling
- 2.3 Production technologies
- 2.4 Surface Systems
- 2.5 Enhanced Geothermal Systems

# Strategic R&D priorities : deep

## TERM 2011-2013:

1. EGS (stimulation, conceptual design of EGS system)
2. BINARY PLANT ( efficiency increase, working fluid non organic and/or supercritical, cooling leg improvement, better cycle thermodynamic, cost reduction); to be adapted according to the current FP7 call published in July 2011
3. ENVIRONMENTAL FOOTPRINT (emission reduction, low noise, visual impact, micro-seismicity, 100% reinjection)
4. MATERIAL (corrosion and erosion mitigation): cross cutting with other sources of energy
5. DRILLING COST MITIGATION (through improvement of current drilling technologies)

# Strategic R&D priorities : deep

## TERM 2014-2017:

1. **RESOURCE ASSESSMENT** (surface exploration, feasibility model)
2. **DRILLING COST MITIGATION** (through improvement of current drilling technologies and development of innovative technologies)
3. **DOWNHOLE PUMP** (low consumption operation at high temperature and high flow rate, availability & reliability)
4. **HIGH TEMPERATURE AND PRESSURE INSTRUMENTATION**
5. **RISK REDUCTION EVALUATION**
6. **MODULAR CONCEPT/ STANDARDIZATION**

# Strategic R&D priorities : deep

Table 12 - Research priorities for deep geothermal

TERM 2020/2030 and beyond:

Short term (2020)	Medium term (post 2020)
<b>Ressource assessment</b>	
Well records & compilation, resource inventory and nomenclature update, resource/reserve reporting code, geothermal data bases	
Basin studies/reservoir evaluation, integrated geophysical/geochemical investigations	
Adaptation of hydrocarbon drilling advances	
Improvement of geothermal drilling, completion and testing practice	
Development of logging and instrumentation, measurement while drilling, etc.	
Development of high-temperature, high-pressure instrumentation, test lab	Test site for high-temperature, high-pressure instrumentation
Evaluation of candidate novel drilling technologies	Development of identified novel drilling technologies
<b>Drilling</b>	
Pumping (production/injection) technology, high temperature submersible pump technology	Pump technology resistant to very high temperature and pressure
Well head/pipe design, new well completion concepts	
Solutions to injection problems in selected clastic environments	
Material definition, development and testing	Material improvement
Corrosion and scaling inhibition	
Sustainability	
<b>Surface installations / components</b>	
Improvements in heating/cooling technology, new building heating/cooling designs	
Combined heat & cold production/distribution	
Retrofitting	
Heating and cooling grid designs (cf. Cross Cutting Research Priorities)	
Power conversion, efficient conversion cycles (binary)	Overcoming development barriers for efficiency improvement for binary cycles
Improved performance of high-temperature heat pumps and absorption chillers (cf. Cross Cutting Research Priorities)	

# Strategic R&D priorities : deep

TERM 2020/2030 and beyond:

Table 13 - Specific research priorities for EGS


Short term (2020) to medium term (post 2020)
EGS nomenclature
Determination of in-situ stress
Hard rock deep drilling stimulation, enhanced stimulation techniques and adequate stimulation strategies to the configuration of every well
Deep drilling, high temperature-pressure instrumentation, well completion
Fracture mapping, assessment of heat exchange areas
Methods for investigating transit time from injection to production well, identification of different transport paths between injection and production wells
Microseismicity, induced seismicity
Rock water interactions
Interactive hydro-thermo-mechanical modelling
Sustainability

## Next Activities

- adaptation to the ETP\_RHC SRA framework (short term)
- elaboration of deployment roadmap (short and medium term, to be started)
- participation/influence in Smart Cities and SET plan Industry initiatives (ongoing, strategic)
- participation in FP 7 and Horizon 2020 (short and medium term, ongoing)
- promotion of national TPs in the geothermal area (strategic, ongoing)

Last but not least...

- promotion of by-side measures: e.g. GEOTRAINET+, REGGEOCITIES, etc..



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**and**