

GEMex Webinar

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STRATEGIC RESEARCH AND INNOVATION ROAD MAP

FOR A COMPETITIVE GEOTHERMAL INDUSTRY IN THE EUROPEAN ENERGY MARKET

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ETIP-DG

European Technology & Innovation
Platform on **Deep Geothermal**

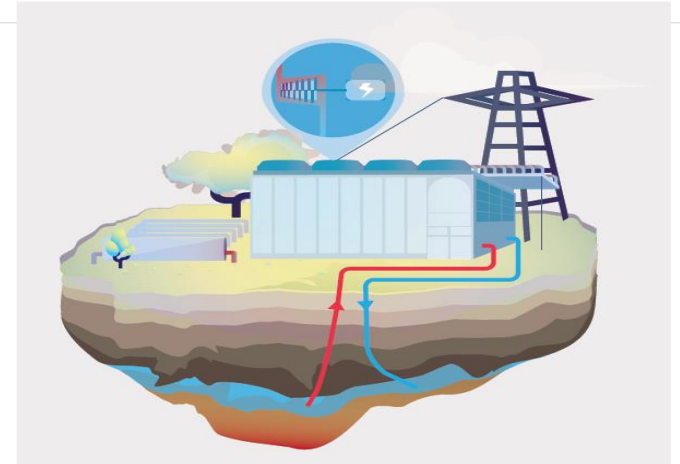
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ETIP_DG : European Technology & Innovation Platform on Deep Geothermal

- ETP_DG was established in March 2016 during a Geothermal Forum of stakeholders, including large companies, SMEs, academia and research institutions.
- The overarching objective is to enable deep geothermal technology to proliferate and reach its full potential everywhere in Europe, achieving the overall cost reduction, including social, environmental, and technological costs.
- ETIP-DG is an open stakeholder group, endorsed by the European Commission under the Strategic Energy Technology Plan (SET-Plan)
- ETIP_DG is liaising with the European Technology and Innovation Platform on Renewable Heating and Cooling (RHC-Platform), officially launched in 2010.



STRUCTURE



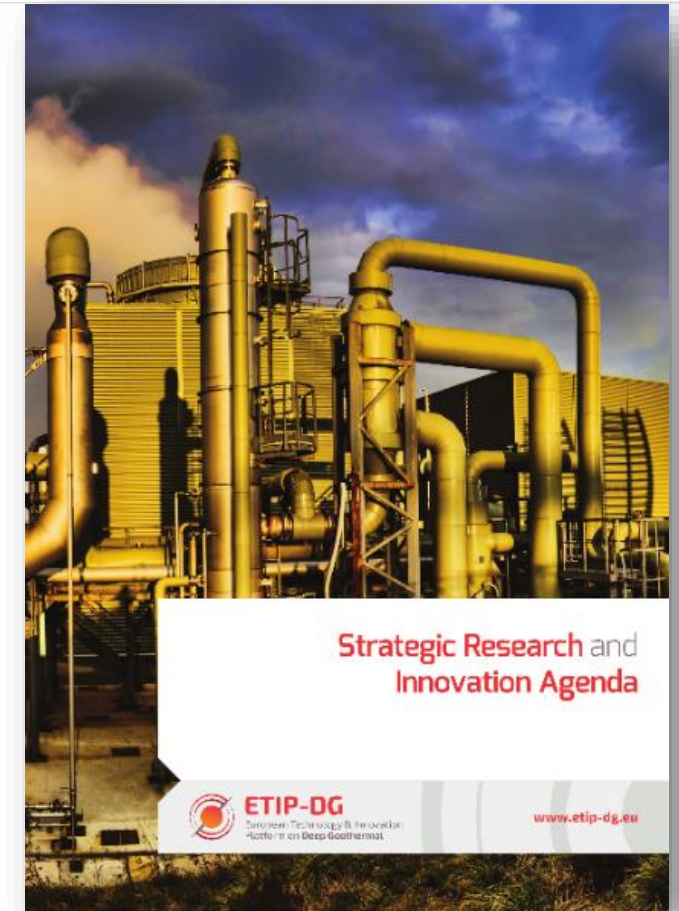
The primary objective is the overall cost reduction of geothermal energy, including social, environmental, and technological costs.

ETIP-DG: The strategic research & innovation agenda (SRIA)

A SRIA has been defined to enable the geothermal industry to grow and play a substantial role in the European energy market.

The SRIA aims to develop new processes and more cost-effective technologies for production of electricity, heating and cooling by:

- unlocking new geothermal resources
- achieving a large reduction of the development and O&M
- increasing the social acceptance of the geothermal projects
- strengthening the European geothermal industry leadership



ETIP-DG – ROAD MAP

A Roadmap on Deep Geothermal has been defined taking in account the TWG input
R&I priorities, targets and KPIs were defined

- **Technical priorities**

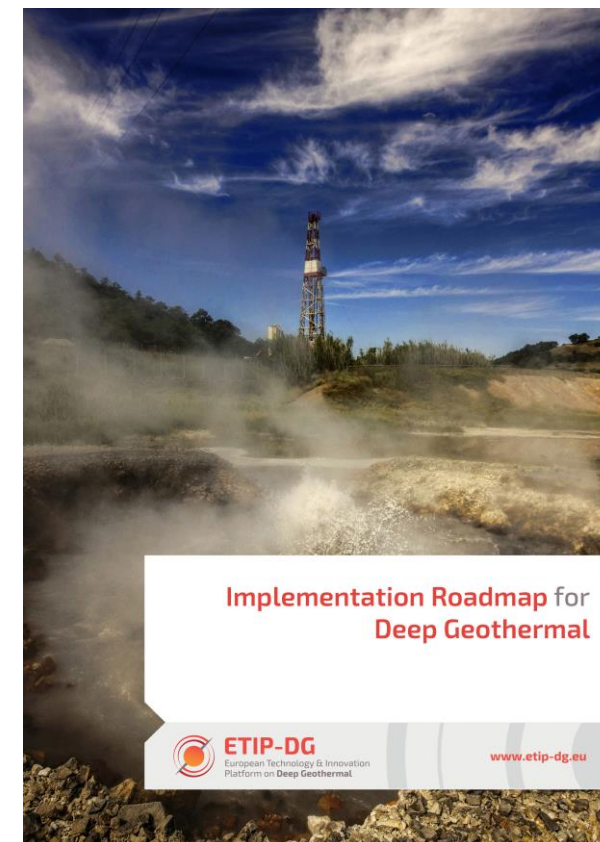
- Prediction and assessment of geothermal resources
- Efficient Resource access and development
- Deployment of Heat and Electricity generation and system integration

- **Non-technical priorities**

- From R&I to development and market uptake
- Knowledge sharing

- **Next generation technologies** (from TRL 1-2 to TRL 3-4 by 2030)

- advanced energy conversion processes and innovative systems
- Innovative concepts for geothermal energy uses
- higher environmental performance
- new approaches for more effective commercialisation



ETIP-DG – ROAD MAP : Technical priorities

Prediction and assessment of geothermal resources

PA-1: Assessing Deep Geothermal resource potential

PA-2: Improved exploration prior to, during and after drilling

PA-3: Exploration workflows and catalogues

PA-4: Cutting edge geothermal resources

Efficient resource access and development

PD-1: Total reinjection and greener power plants

PD-2: Reduce the impact of scaling & corrosion and improve equipment lifetime

PD-3: Efficient resource development

PD-4: Effective and rapid penetration rate technology to access the resource

PD-5: New electronics to monitor and operate geothermal well

Deploy Heat and electricity generation and system integration

PS-1: Developments in turbines

PS-2: Flexible production of heat and power and integration for smart grids

PS-3: High-Temperature Thermal Energy Storage (HT-TES)

PS-4: Developing hybrid plants and Exploiting mineral production



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ETIP_DG - ROAD MAP : non technical priorities

- **Shift from R&I to deployment:**
 - Proposition of regulatory, financial, political and social solutions to boost ing the deployment of innovation in the sector,
 - Rise the market uptake all over Europe, creating jobs
 - Reinforcing technological leadership to cultivate significant export opportunities.
- **Knowledge sharing:**
 - Establishing an open-access policy to geothermal information (including standard exchange formats) to ensure easy access to data and information,
 - Launch a pan-European hub of scientific excellence and research infrastructures.

ETIP_DG - ROAD MAP: next generation technologies

This groundwork shall address long-term applications and stimulate breakthrough possibilities with concept today at TRL 1-2 to progress to TRL 3-4 by 2030.

- Geothermal resource assessment through deep probing earth observation
- Geothermal Energy Buffers (GEB), a hybrid energy system involving solar thermal and electricity storage
- Develop bio-inspired robots for revolutionary drilling: more efficient, less costly with automatization, safer, environmentally friendly
- Create an underground energy system, including multi-radial wells, closed underground heat exchangers
- Use of IT tools based on data mining and machine learning for resource assessment, access to the resource and generating energy
- Connecting the reservoir with the surface: reliable and resilient data transfer
- Produce energy from geothermal offshore installations

ETIP_DG ROAD MAP : IMPLEMENTATION PLAN AND BUDGET

PRIORITIES	2020-2023	2023-2026	2026-2030	Budget (estimated)
Prediction and assessment of geothermal resources				
PA-1: Assessing Deep Geothermal resource potential				€ 400.000.000
PA-2: Improved exploration prior to, during and after drilling				€ 50.000.000
PA-3: Exploration workflows and catalogues				€ 50.000.000
PA-4: Cutting edge geothermal resources				€ 50.000.000
Efficient resource access and development				
PD-1: Total reinjection and greener power plants				€ 125.000.000
PD-2 Reduce the impact of scaling & corrosion and improve equipment and component lifetime				€ 75.000.000
PD-3: Efficient resource development				€ 200.000.000
PD-4: Improved rate of penetration technology to access the resource				€ 140.000.000
PD-5: New electronics to monitor and operate geothermal well				€ 60.000.000
Deploy Heat and electricity generation and system integration				
PS-1: Developments in turbines				€ 100.000.000,00
PS-2: Flexible production of heat and power and integration for smart grids				€ 140.000.000,00
PS-3: High-Temperature Underground Thermal Energy Storage				€ 70.000.000,00
PS-4: Developing hybrid plants and Exploiting mineral production from geothermal sources				€ 180.000.000,00
Next generation of technologies				€ 120.000.000,00
Non technical priorities				
From R&I to deployment				€ 40.000.000
Knowledge Sharing				€ 40.000.000
			TOTAL BUDGET	€ 1.840.000.000

ETIP_DG ROAD MAP : IMPLENTATION CHALLENGES

➤ The **competitiveness of the geothermal energy** in Europe in 2030 is definitely linked to the ability of the whole geothermal sector to successfully implement this road map, according to the targets set by SET-Plan Declaration:

- 15 €/kWh for electricity and 6 €/kWh for heat by 2023
- 10 €/kWh for electricity and 5 €/kWh for heat by 2026.

These cost targets hold for all types of deep geothermal projects, including EGS and very high geothermal systems (> 350°C).

➤ However **some barriers** (i.e. regulatory, financial, ...) to develop geothermal power projects in Europe still persist and need to be overcome through the public support at the beginning of geothermal development. The setting of a favorable frame is also required to ensure security for investment in deep geothermal.

➤ Three **key success factors** are essential in the different stages of basic research, development, demonstration, deployment, and commercial market uptake.

- **Visionary approach to innovation**
- **Coordinated actions and synergy among the different actors**
- **Financial support through public funding and economic incentive**

THANKS FOR YOUR ATTENTION

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