

European Technology & Innovation Platform on Deep Geothermal

Accelerating the development of **deep geothermal** technology in Europe

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ETIP-DG

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

www.etip-dg.eu



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THE VISION

Promotion of the research and innovation in the Deep Geothermal sector to contribute to the City of the Future, where a combination of renewable energy sources are integrated into the system.



Domestic heat and electrical power demand in Europe can be significantly covered taking the advantage offered by the flexibility of geothermal production.

MISSION

- **Contribute to clean energy production in Europe by further unlocking geothermal energy**
- **Improvement of social welfare by a responsible deployment of Deep Geothermal energy**



ETIP-DG ORGANIZATION

STRUCTURE

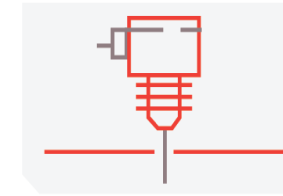


ETIP_DG brings together representatives from industry, academia, research centres, and sectoral associations, covering the entire deep geothermal energy exploration, production, and utilization value chain.

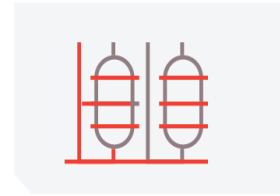
WORKING GROUP



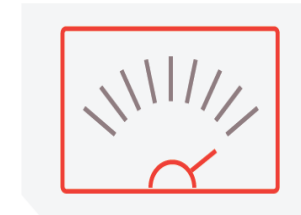
Exploration



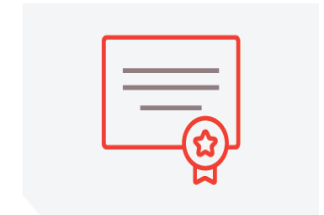
Deep Drilling



Production technologies

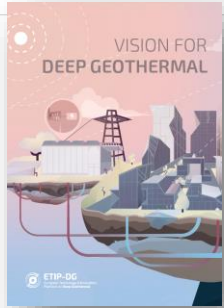


Surface systems



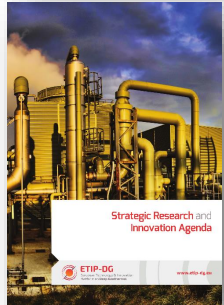
Non-Technical

ETIP_DG – MAIN ACHIEVEMENTS



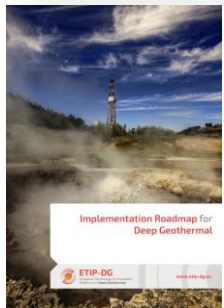
- VISION FOR DEEP GEOTHERMAL (January 2019 - March 2019)

- ✓ Open consultation process with the Stakeholders
- ✓ Publication



- STRATEGIC RESEARCH AGENDA (March 2019 - April 2019)

- ✓ Data collection and discussion about RD&I priorities with TWG.
- ✓ Drafting with the contribution of ETIP_DG WG
- ✓ Publication



- ROAD MAP (May-June 2019).

- ✓ SC prepare a list of topics to be included in the Roadmap.
- ✓ Questionnaire for definition of the priorities
 - Open discussion and validation during the ETIP_DG Annual Conference
 - Publication

THE ROAD MAP

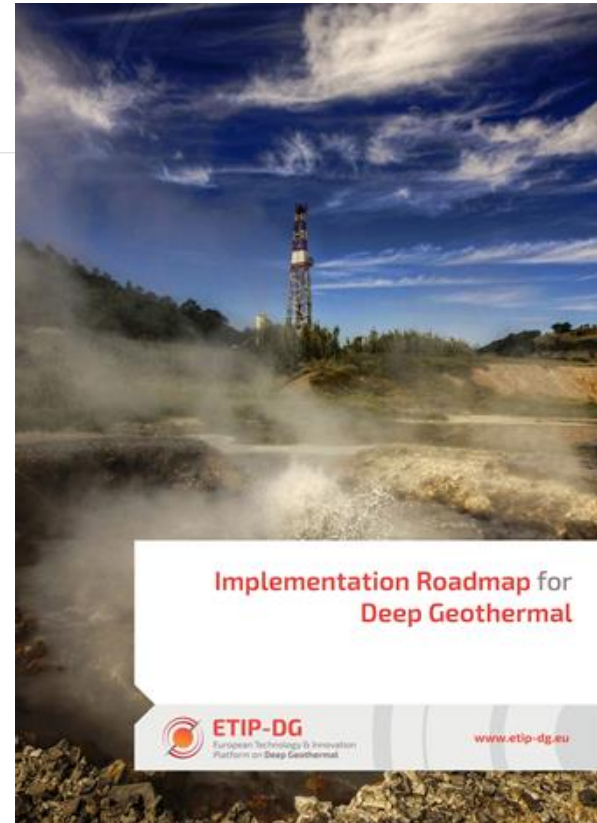
From Vision and SRIA, R&I priorities, targets and KPIs were defined for unlocking geothermal energy and improving social welfare:

Technical

1. Better Prediction and assessment of geothermal resources
2. More efficient Resource access and development
3. Deploy Heat and electricity generation and system integration

Non technical

1. From R&I to deployment, market uptake
2. Knowledge sharing



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

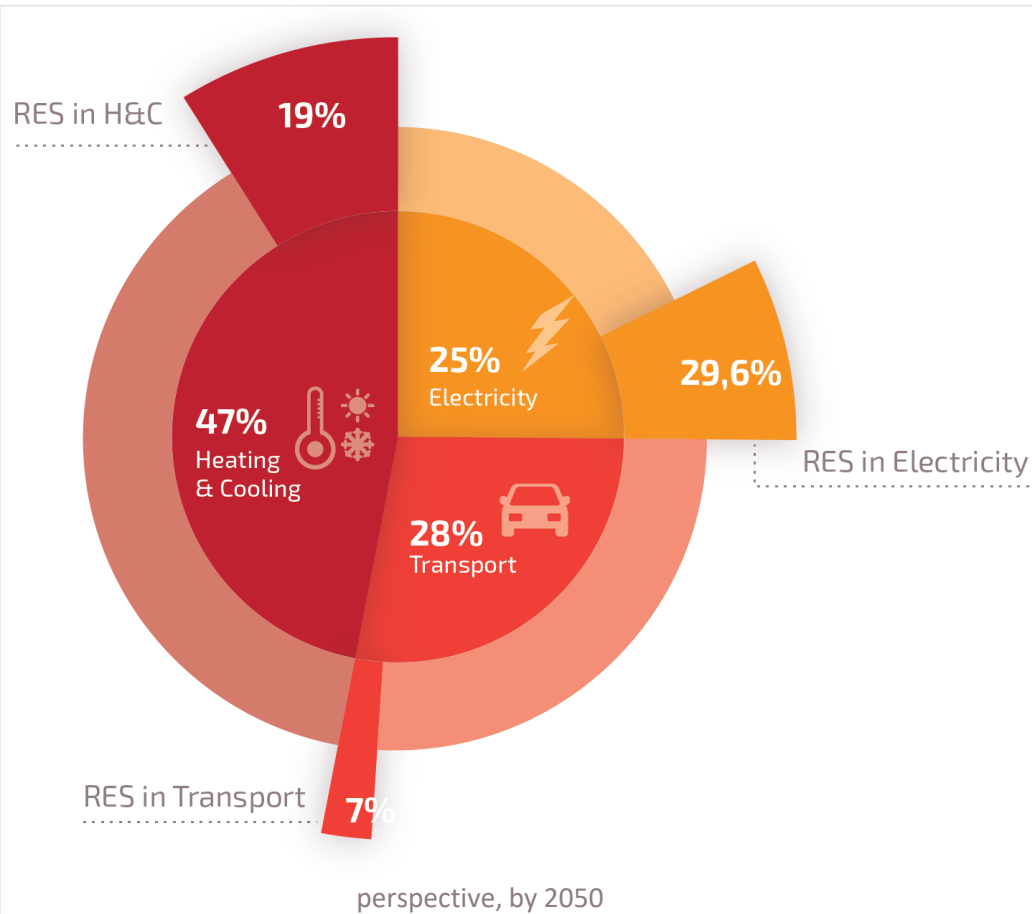
PS-3: High-Temperature Thermal Energy Storage (HT-TES)

PS-4: Developing hybrid plants and Exploiting mineral production

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.

IMPLEMENTATION OF THE ROAD MAP – CHALLENGES (1)



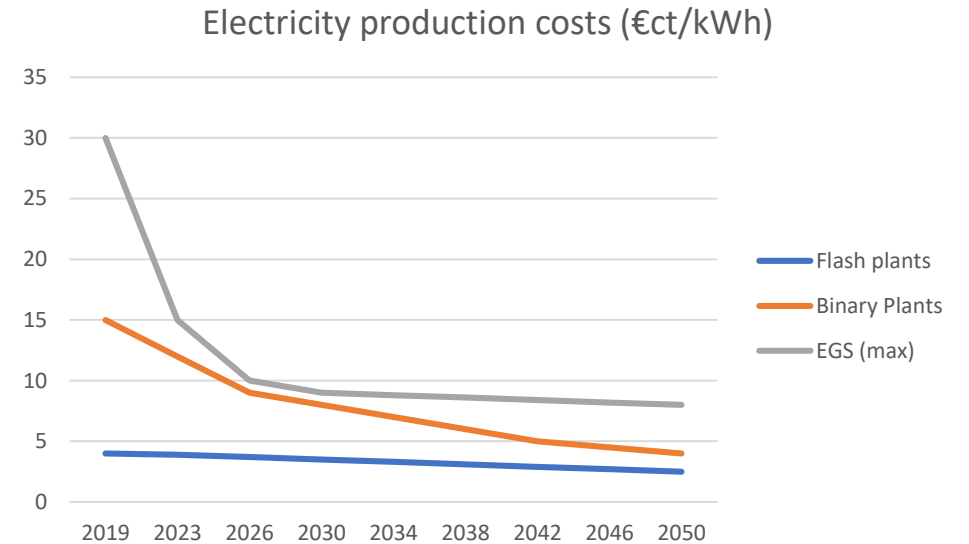
This Implementation Roadmap on Deep Geothermal identifies a path forward, developing highly-performant, cost-effective, and sustainable deep geothermal technologies that can expand the production of electricity, heating and cooling while reinforcing EU industrial capacity and leadership in the sector.

IMPLEMENTATION OF THE ROAD MAP – CHALLENGES (2)

According to the target of the SET-Plan Declaration the maximal production cost for geothermal energy are

- 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).



IMPLEMENTATION OF ROAD MAP: CHALLENGES (3)

The competitiveness of the geothermal energy in Europe in 2030 and 2050 is definitely linked to the ability of the whole geothermal sector to successfully implement this road map,.

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

- Innovative approach
- Coordinated actions and synergy among the different actors
- Financial support through public funding and economic incentive

**THANKS
FOR YOUR
ATTENTION**



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THE TARGETS AND GOALS

To embrace the large geothermal potential of Europe in a coordinated and responsible way, and to maintain global leadership in the sector, in 2016, the SET-Plan stakeholders from the European geothermal sector agreed to:

Six ambitious targets (T)

- *T1: Increase reservoir performance* [including underground heat storage], reducing the power demand of reservoir pumps to below 10% of gross energy generation and achieving a predicted 30-year or greater sustainable yield by 2030
- *T2: Improve the overall conversion efficiency*, including the bottoming cycle, of geothermal installations at different thermodynamic conditions by 10% by 2030 and 20% by 2050
- *T3: Reduce the production costs* (including from unconventional resources, EGS, and/or from hybrid solutions which couple geothermal with other renewable energy sources) to below €0.10/kWhe for electricity and €0.05/kWhth for heat by 2025
- *T4: Reduce exploration costs* by 25% in 2025 and by 50% in 2050 compared to 2015
- *T5: Reduce the unit cost of drilling* (€/MWh) by 15% in 2020, 30% in 2030 and by 50% in 2050 compared to 2015
- *T6: Demonstrate the technical and economic feasibility of responding at any time to commands from a grid operator to increase or decrease output ramp up and down from 60% - 110% of nominal power*

Two transversal goals (G)

G1: Transparent and harmonized methods and instruments for technical and financial risk management

G2: Increased social acceptability and mitigation of unsolicited side effects (induced seismicity, emissions To the environment).