

A Vision for Deep Geothermal

Deep geothermal in 2030-2050



ETIP-DG

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

www.etip-dg.eu



Co-funded by the European Union's Horizon 2020 Research and Innovation Programme [GA. N. 773392]

About the Vision



This VISION looks toward **the future of Deep Geothermal energy development** by 2030, 2040, 2050 and beyond, and highlights the great potential of untapped geothermal resources across Europe. After an **Introduction & Overview** the document briefly describes the **Actual Status of geothermal development** and the VISION's aim for

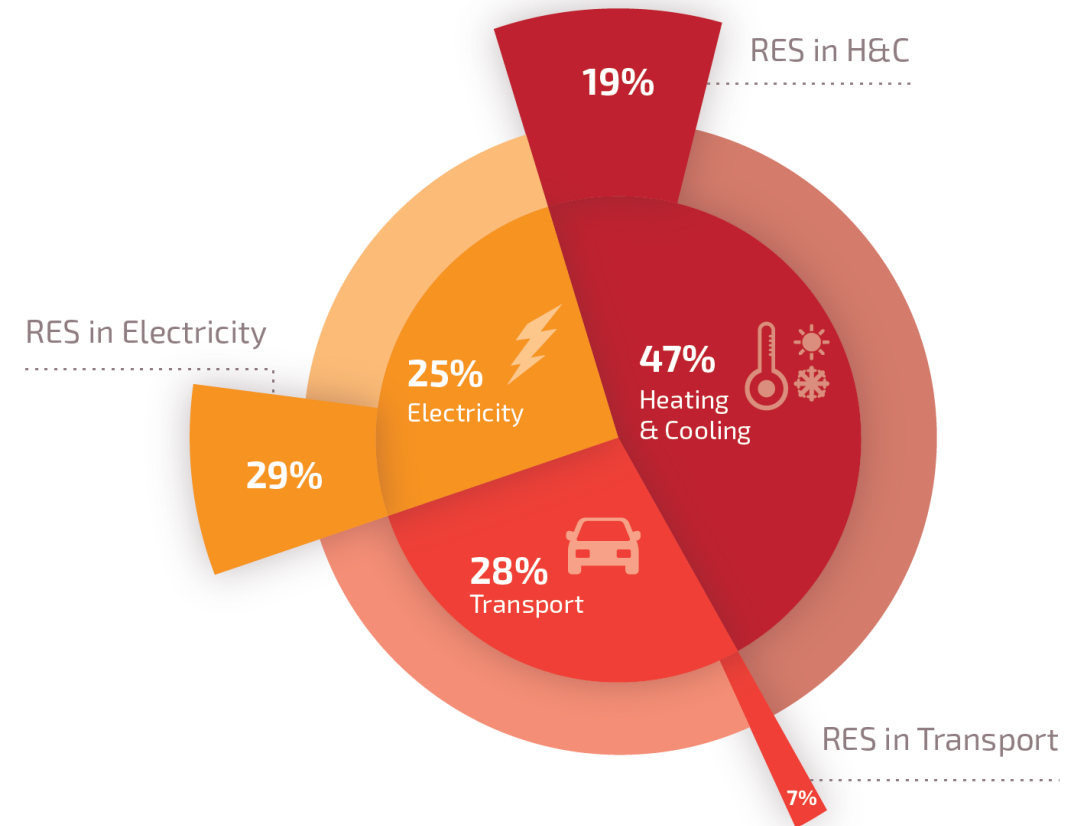
- > **Unlocking geothermal energy**
- > **Increasing the Social welfare in Europe**
- > **Novel technologies for full and responsible deployment of geothermal potential**

Rising to the Vision

Our VISION is to cover

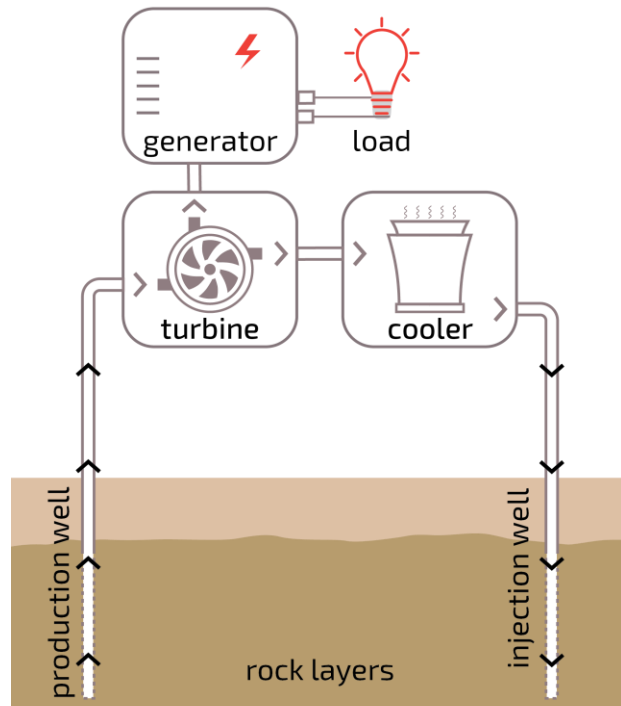
- > any **domestic heat demand** and
- > a large part of **electrical power demand** in Europe by geothermal energy.

This includes taking the maximum advantage offered by the flexibility of geothermal production, providing large **centralized** as well as domestic and **decentralized** small scale options.



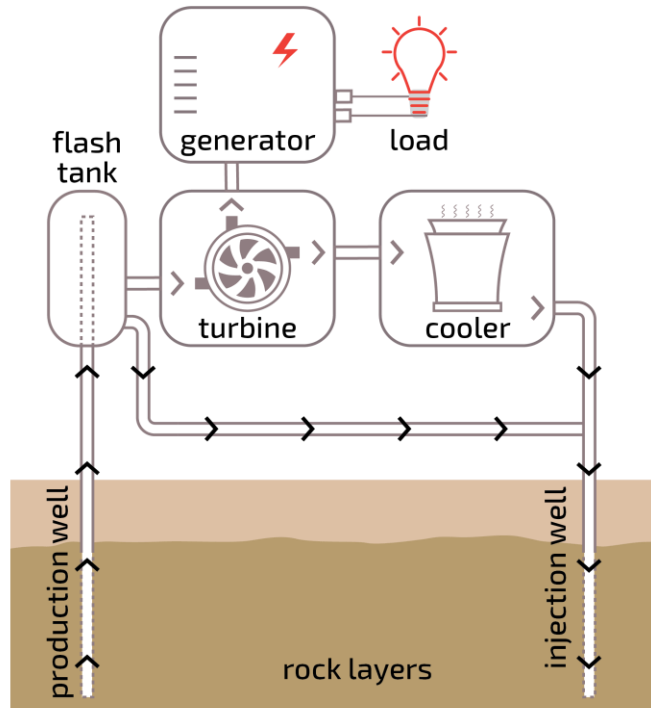
Technologies for electricity production

Dry steam power plants



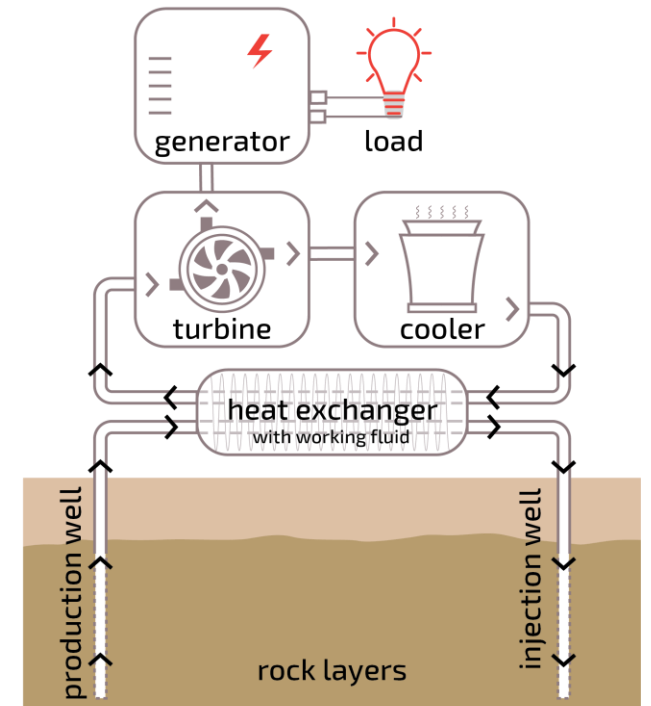
Highly cost competitive but geographically limited

Flash steam power plants



Most dominant in terms of global capacity

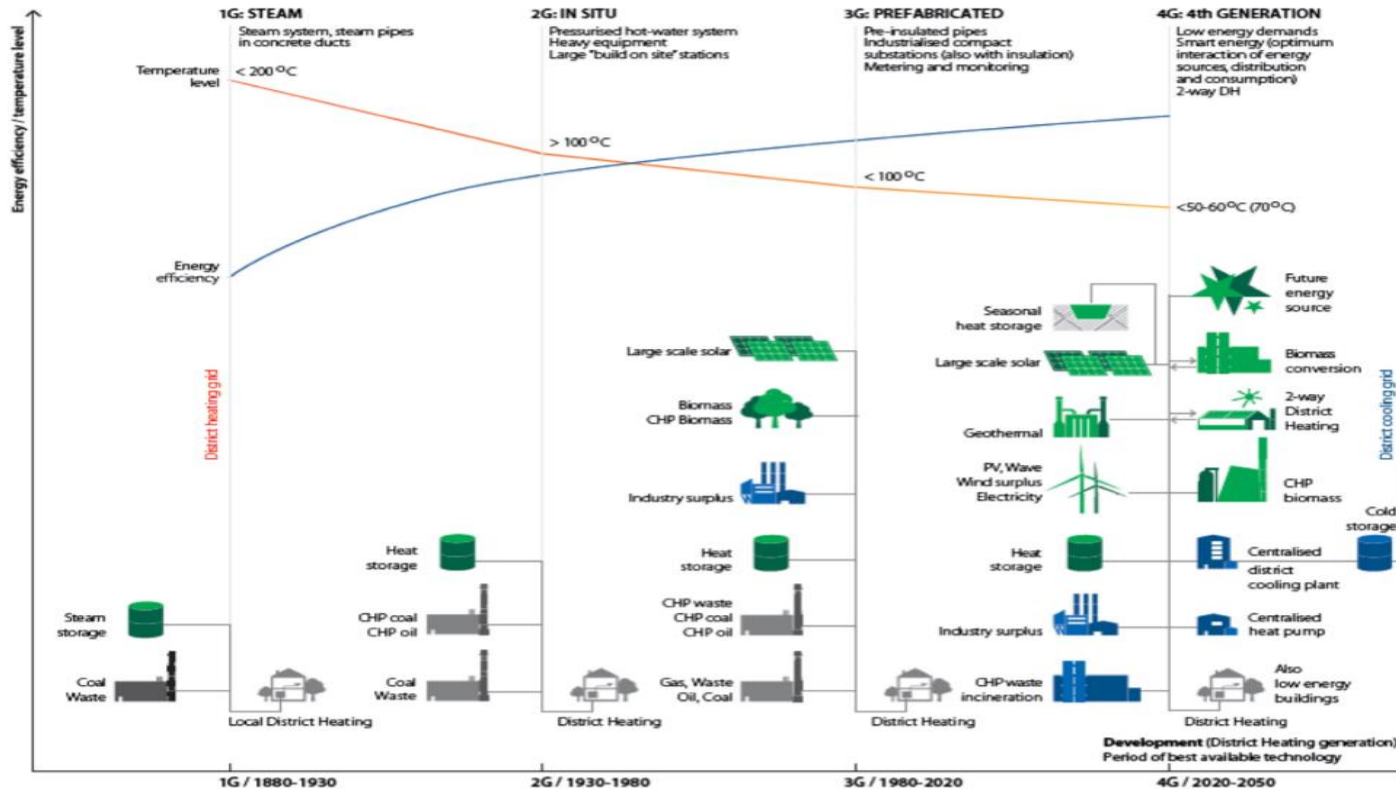
Binary cycle power plants



Useful alongside geothermal heating, hot spring, etc

Unlocking Geothermal Energy: Heat development

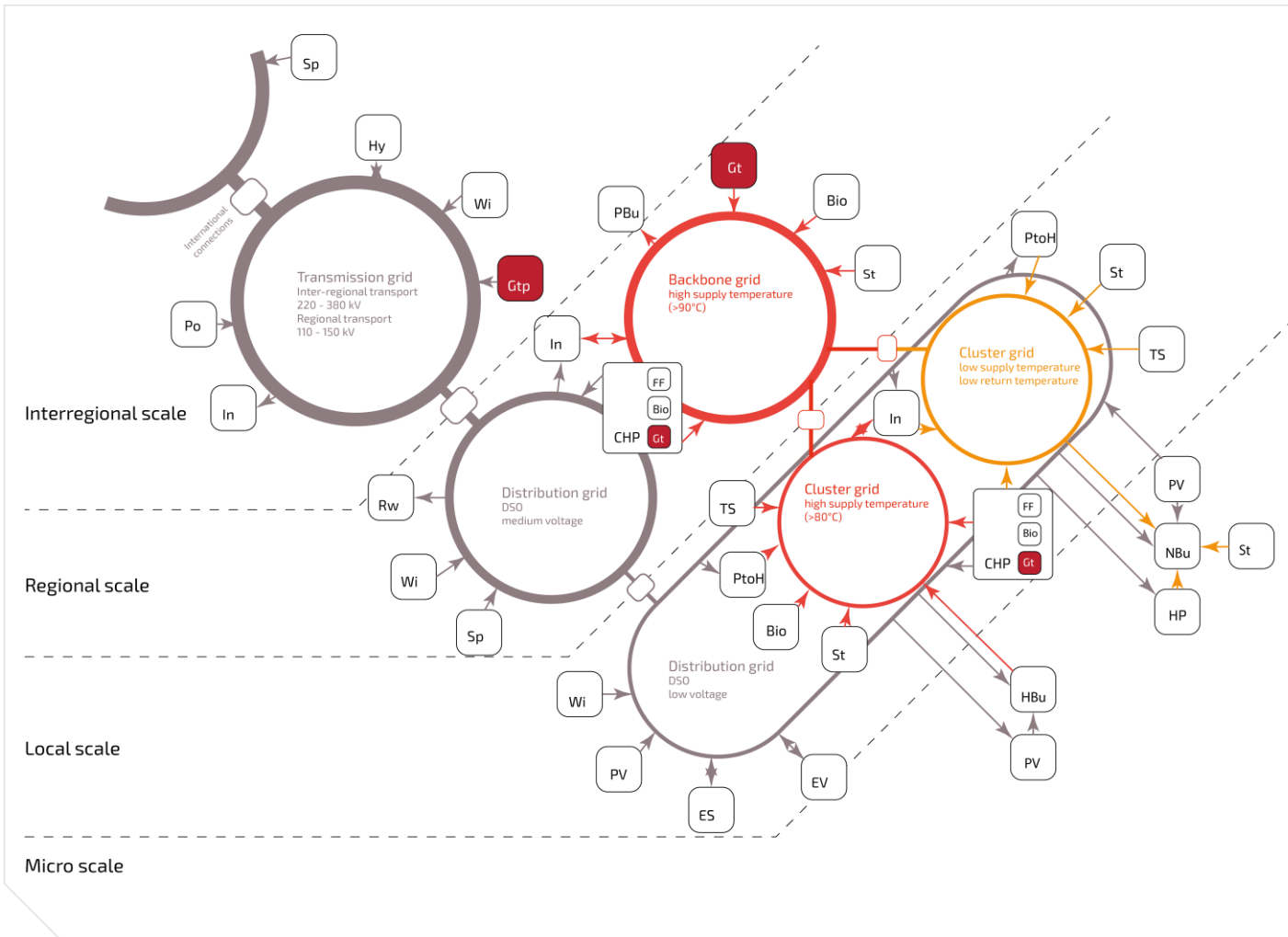
Graph: Evolution of DH based on Lund 2014.



Messages:

- Operative temperatures of the DHC network can be reduced
- By demand site management or by thermal energy storage it will be possible to balance heat demand and supply in a DH network.
- Cascade applications
- CHP

Unlocking Geothermal Energy: Power development



Graph: In the RES based interconnected energy networks geothermal and underground thermal storage play an important role

Messages:

- Improved efficiency, optimization of material, processes, cycle design
- Hybrid, proper combination
- Cutting edge technologies for any kind of resource (super-hot, off-shore, geopressurized) and any place (from remote islands to urban areas)

Unlocking Geothermal Energy: Combined production

> Coupling renewable heat and electricity sectors and markets for an optimal use of geothermal energy

- The city of the future
- Consumer-producer-prosumer perspectives
- Thermal storage to help balance and to optimize production
- Cascade, hybrid, synergy (e.g. geothermal-algae-biofuels-transport)



Combined biomass and geothermal plant in Cornia, Italy



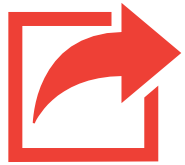
Increasing the social welfare in Europe

- Achieve lower **environmental footprint**
- Create **wealth**
- Strengthen **dissemination, education and outreach**
- Guarantee **protection and empowerment** of customers



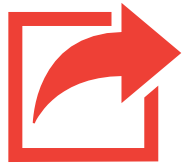
Novel/New generation of technologies and full and responsible deployment of geothermal potential

- Technologies beyond H2020
- While targeting the EU long-term goal of **reducing costs** and **increase performance** of geothermal technologies and installations, RD&I pursue all opportunities for complete deployment of geothermal resources, aiming at various advancements



Key messages

- **Optimization:** Geothermal is a versatile energy, whose multiple-applications are optimized by cascade uses of heat
- **Growth:** Geothermal resources are yet to be developed in most parts of the world and are ready to become a local economic development booster
- **Feasibility:** Geothermal has a large margin of progress in numerous applications and places
- **Sustainability:** The geothermal environmental footprint is much lower than those of other energy sources
- **Flexibility & base load:** Geothermal can be adapted to any type of energy demand, providing base load energy when needed



Key messages

- **Stability & availability:** Geothermal energy is available around the clock and has a predictable output
- **Cogeneration & hybridization:** Geothermal can be combined with other energy sources and technologies to increase efficiency
- **Resource potential:** Geothermal is a widely available energy source, since underground heat is available everywhere
- **Cool & appealing:** beside cooling the air of our houses, working spaces, malls, airport... geothermal is simply beautiful because it is essentially invisible
- **Market penetration & social dimension:** Geothermal is a domestic and green resource, secure, stable, clean, and contributes to energy efficiency



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No [773392 — DG ETIP]

