

# A Vision for Deep Geothermal

Deep geothermal in 2030-2050



**ETIP-DG**

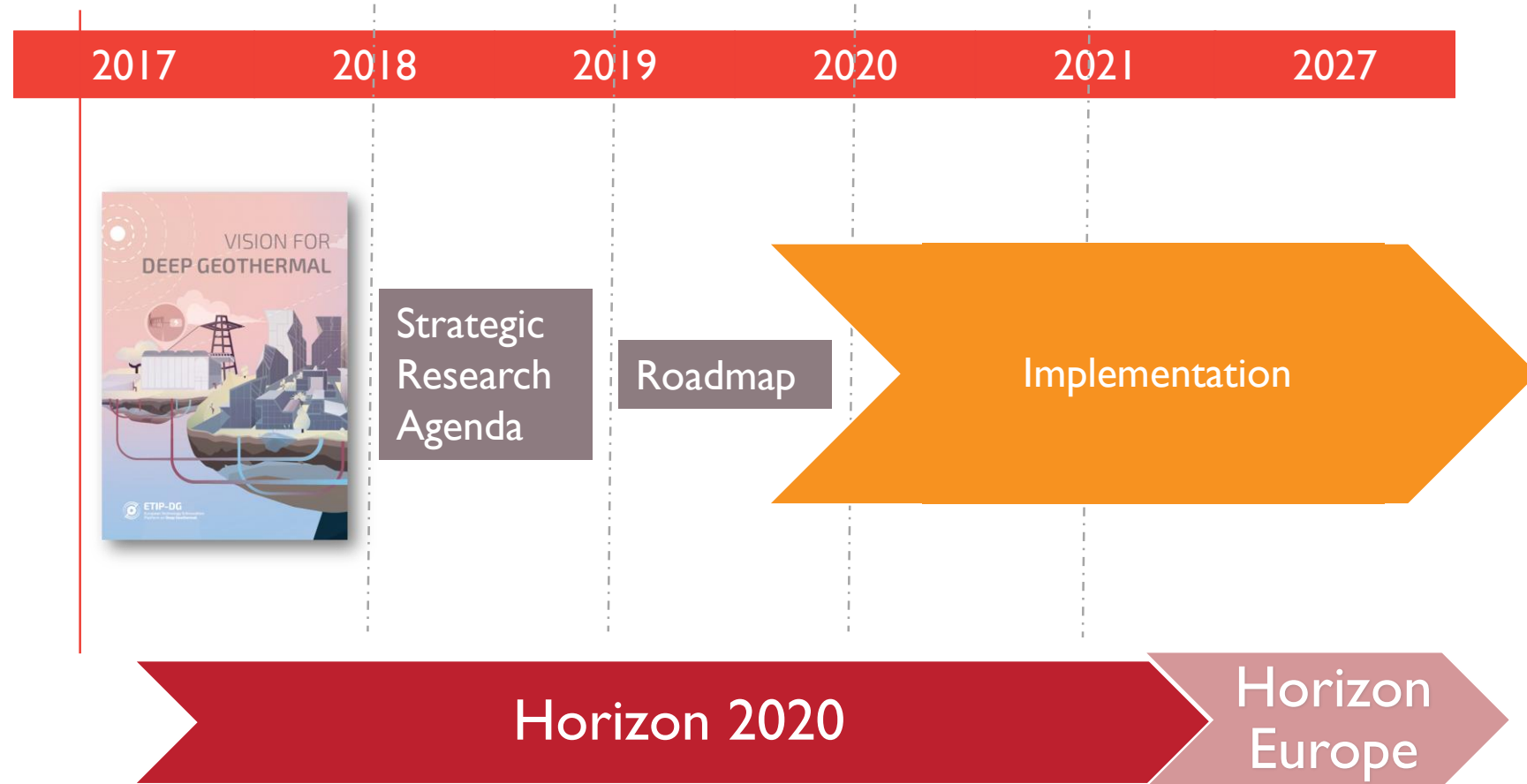
European Technology & Innovation  
Platform on **Deep Geothermal**

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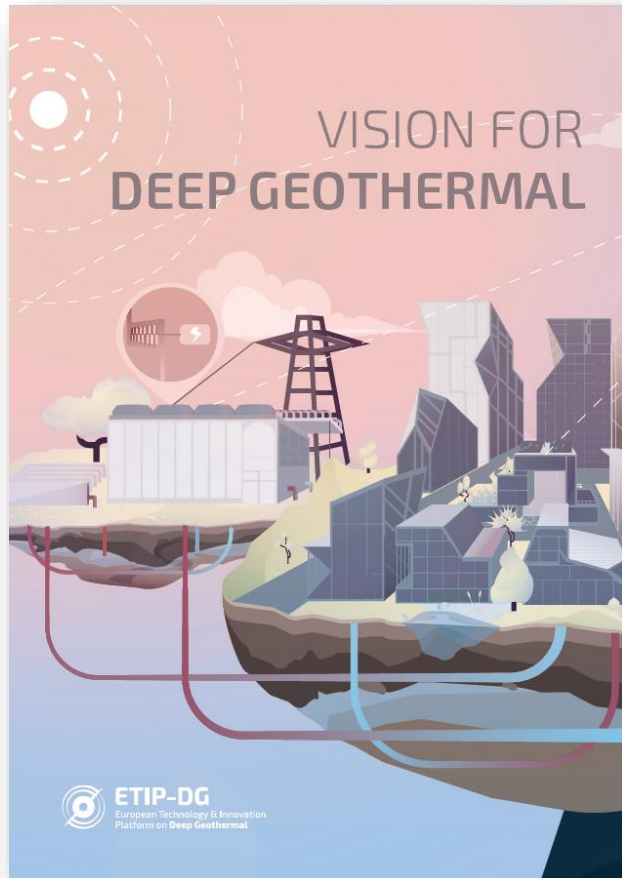


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# ETIP activities



# 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

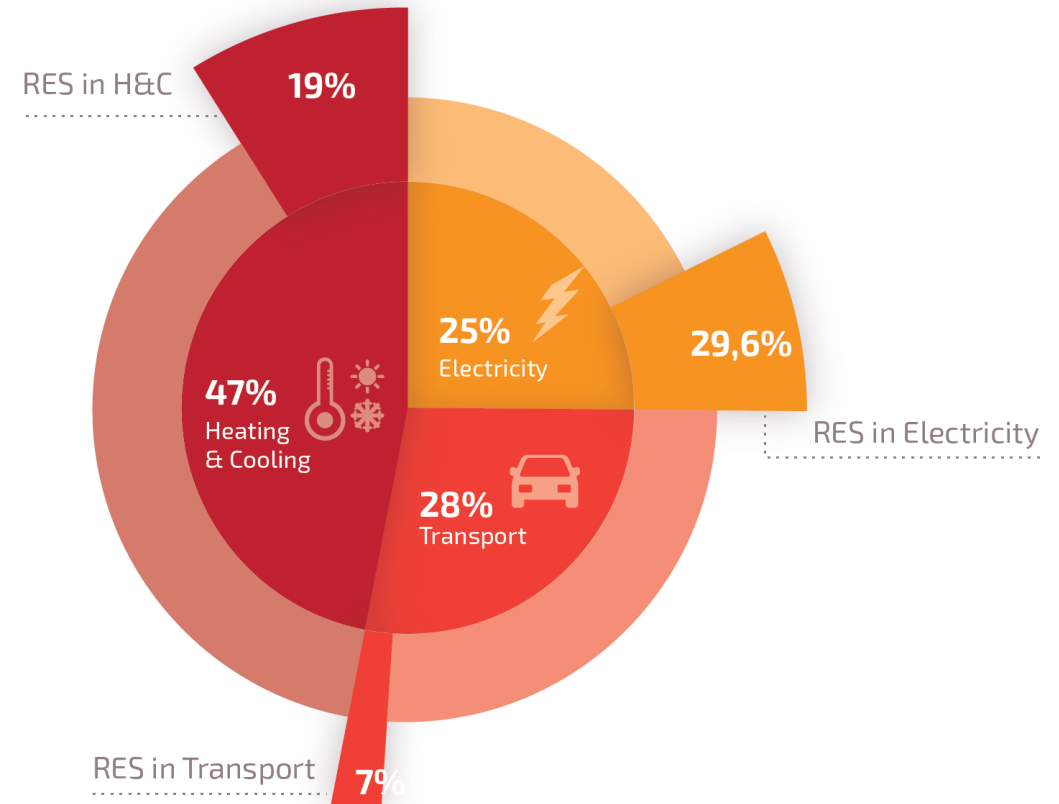
- > **Unlocking geothermal energy**
- > **Increasing the Social welfare in Europe**
- > **Novel technologies for full and responsible deployment of geothermal potential**

# Rising to the Vision

Our VISION is to cover

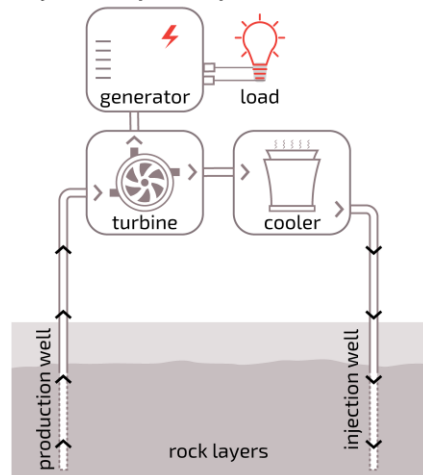
- > A significant part of **domestic heat demand** and
- > a large part of **electrical power demand** in Europe by geothermal energy.

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.

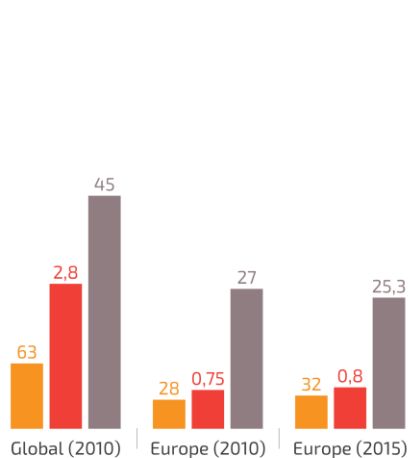


# Technologies for electricity production

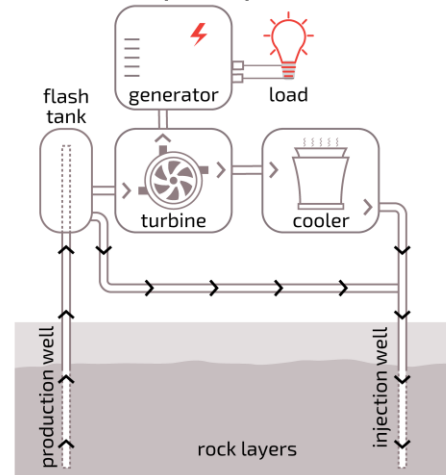
## Dry steam power plants



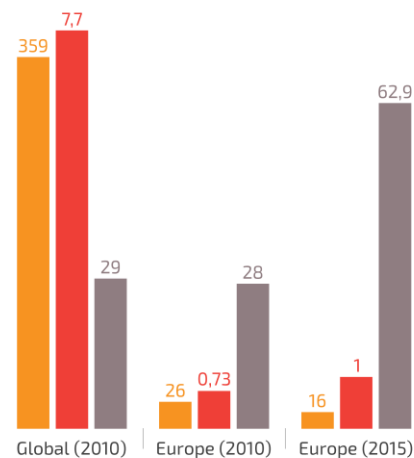
Highly cost competitive but geographically limited



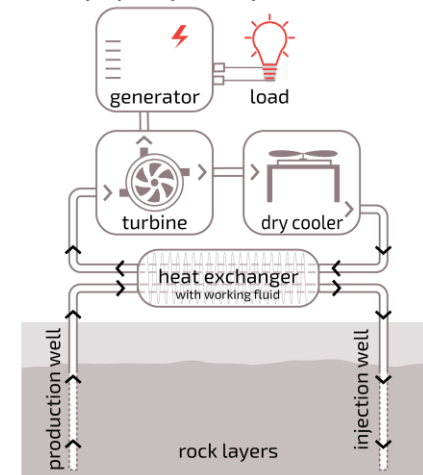
## Flash steam power plants



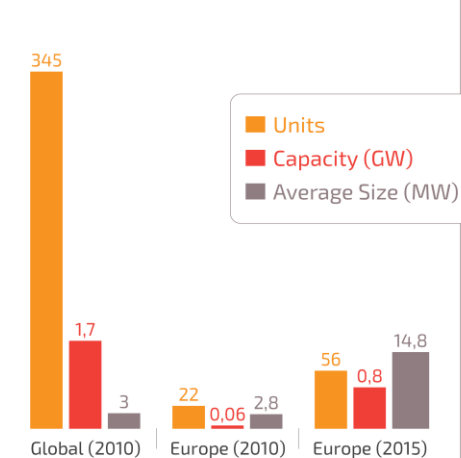
Most dominant in terms of global capacity



## Binary cycle power plants



Useful alongside geothermal heating, hot spring, etc

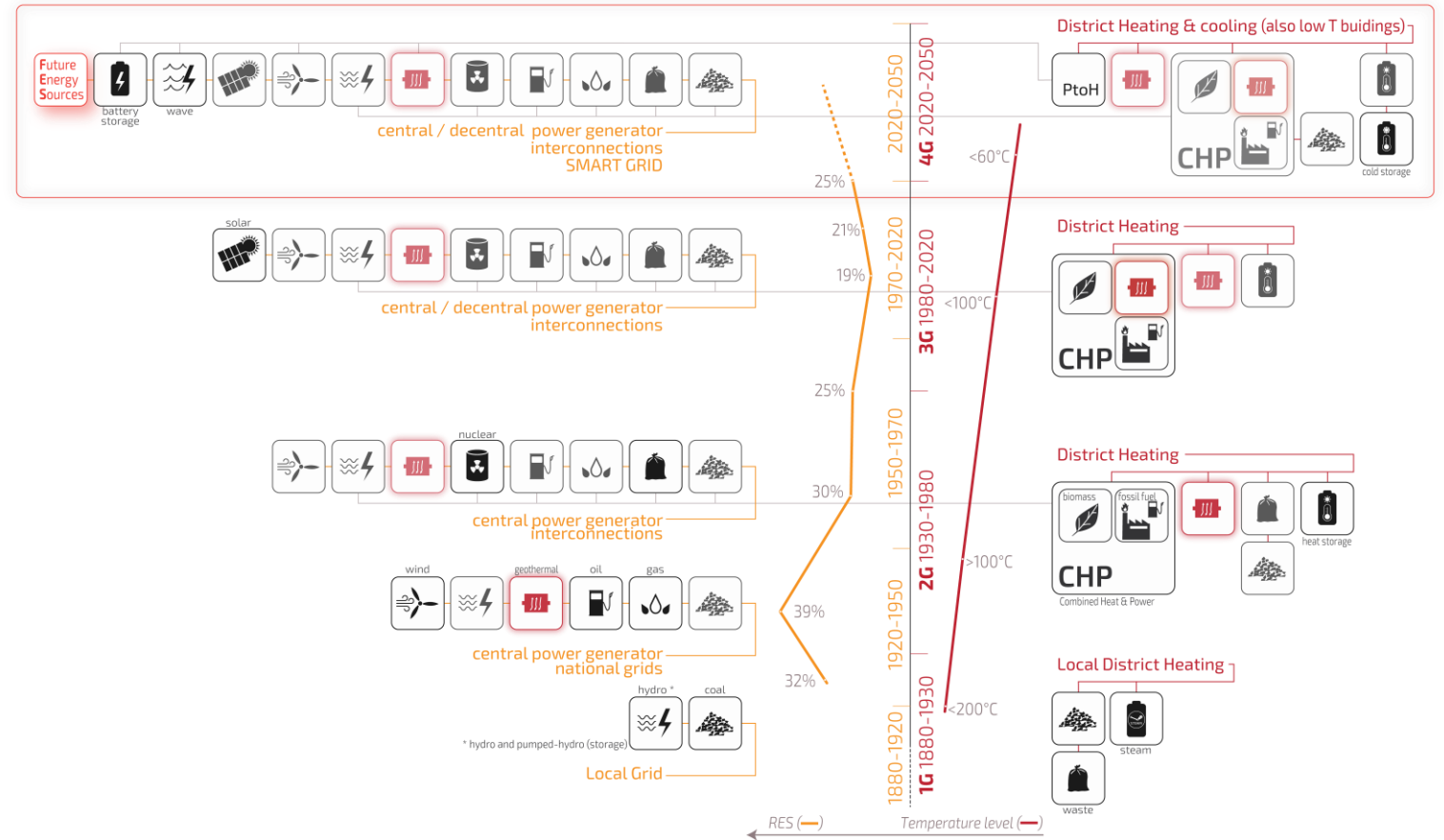


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# Unlocking Geothermal Energy: Heat development

- > 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



Evolution of power generation and district heating

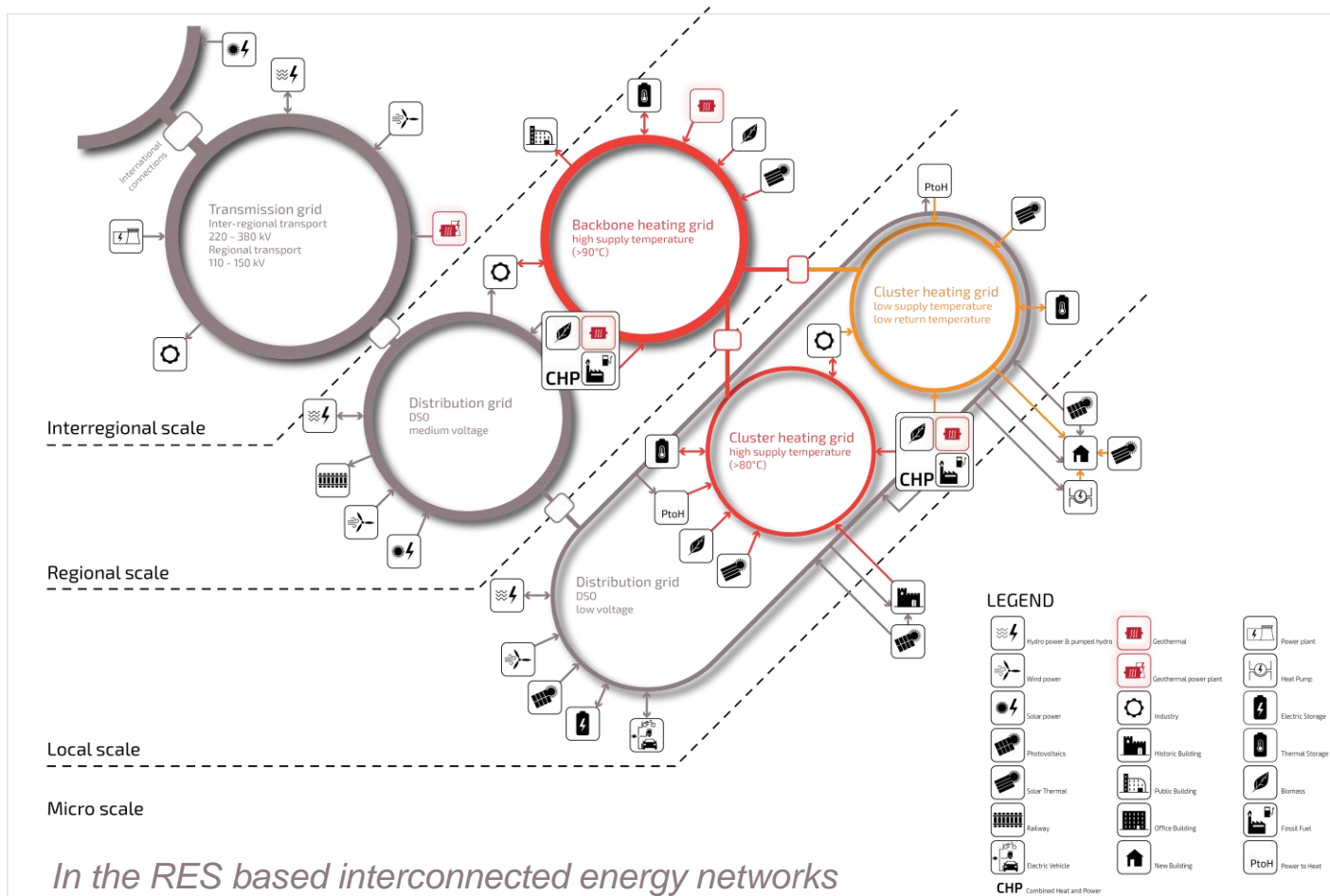
# Unlocking Geothermal Energy: Power development



*Combined biomass and geothermal plant in Cornia, Italy*

- > 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

> Consumer-producer-prosumer perspectives

> Thermal storage to help balance and to optimize production

> Cascade, hybrid, synergy (e.g. geothermal-algae-biofuels-transport)

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





# The City of the Future

# Increasing social welfare in Europe

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



# Novel technologies for 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



### RESOURCE POTENTIAL

Geothermal is a widely available energy source, since underground heat is available everywhere

### FIT FOR PURPOSE

Geothermal has a large potential of expansion in numerous applications and places

### STABILITY & AVAILABILITY

Geothermal energy is available around the clock and has a predictable output

### GROWTH

Production from untapped geothermal resources has the potential to become a local economic development booster

# KEY MESSAGES

### SUSTAINABILITY

The geothermal environmental footprint is much lower than those of other energy sources

### COGENERATION & HYBRIDISATION

Geothermal can be combined with other energy sources and technologies to optimise efficiency

### OPTIMISATION

Geothermal is a versatile energy, whose multiple-applications are optimised by cascading uses of heat at progressively lower temperatures

### COOL & APPEALING

Beside cooling the air of our houses, working spaces, malls, and airport geothermal is simply beautiful because it is essentially invisible

### FLEXIBILITY

Geothermal operates continuously to meet the minimum level of power demand and may adapt to meet variable levels of energy demand

### MARKET PENETRATION & SOCIAL DIMENSION

Geothermal is a domestic and green resource, secure, stable, clean, and contributes to energy efficiency



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# Key messages

- **Resource potential:** Geothermal is a widely available energy source, since underground heat is available everywhere
- **Fit for purpose:** Geothermal has a large margin of progress in numerous applications and places
- **Stability & availability:** Geothermal energy is available around the clock and has a predictable output
- **Growth:** Geothermal resources are yet to be developed in most parts of the world and are ready to become a local economic development booster
- **Sustainability:** The geothermal environmental footprint is much lower than those of other energy sources



# Key messages

- **Cogeneration & hybridization:** Geothermal can be combined with other energy sources and technologies to increase efficiency
- **Flexibility:** Geothermal can be adapted to any type of energy demand, providing base load energy when needed
- **Optimization:** Geothermal is a versatile energy, whose multiple-applications are optimized by cascade uses of heat
- **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