

Policy Solutions to facilitate the deployment of geothermal district heating and cooling

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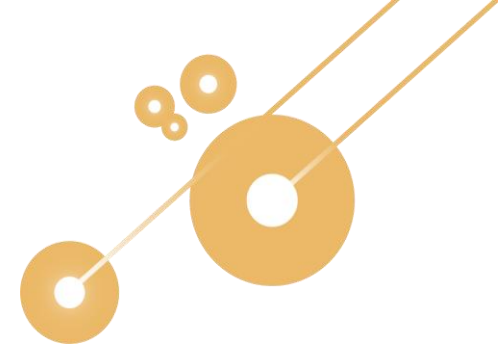


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Introduction

The barriers to geothermal project development

- Business model: need to secure the demand for heating and cooling
- Availability of infrastructure: geothermal developers cannot invest without certain access to a heat network
- Geothermal resource risk
- Regulatory risk: complex licensing & autorisation procedures, and regulatory framework not suited to geothermal projects prevent investments



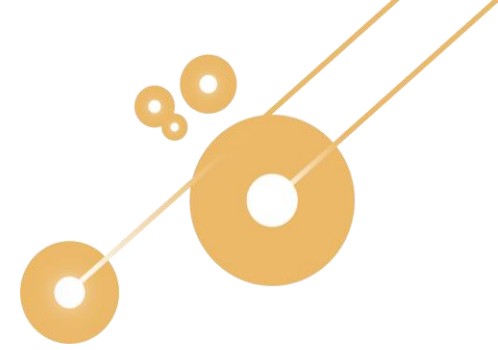
Addressing the regulatory risk

- The Renewable Energy Directive (2018/2001) contains provisions to mitigate the regulatory risk and facilitate developments

Article 6: *“the support granted to renewable energy projects are not revised in a way that negatively affects the rights conferred thereunder and undermines the economic viability of projects that already benefit from support.”*

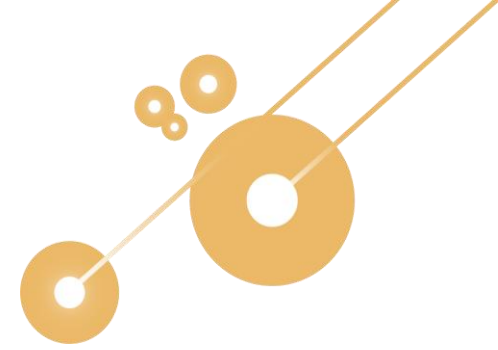
Article 16 on Organisation and Duration of the Permit Granting process:

A streamlining of the process can help geothermal investors



Local energy planning facilitates investments

- Local planning of energy infrastructure and investments allows to bridge the gap between energy suppliers and consumers
- Planning gives strong signals to developers of energy supply and infrastructure to come together and layout developments
- Local authorities are key to securing the energy demand for the geothermal heating and cooling projects
 - In the case of new networks, the geothermal and district heating and cooling business model must be competitive with gas, because households cannot be forced to connect
- On 13/12/2019, GEORISK/Covenant of Mayors Workshop highlighted this role of local energy planning (Hotmaps project, Strasbourg Eurométropole geothermal energy planning)

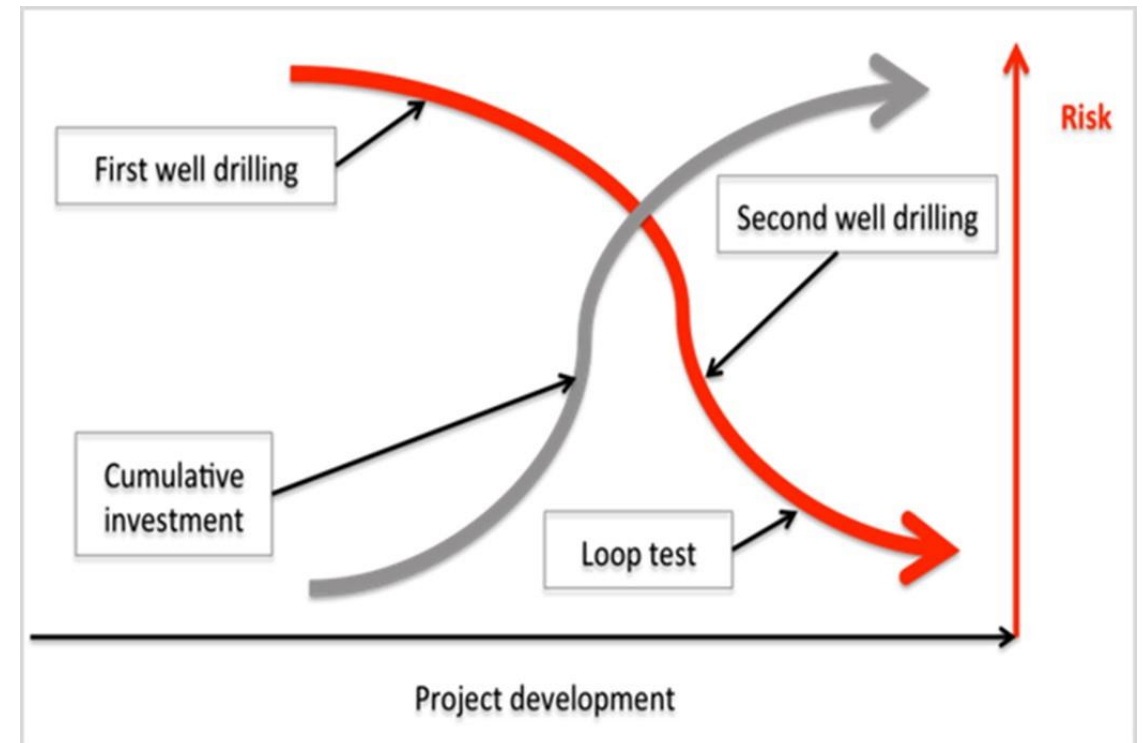


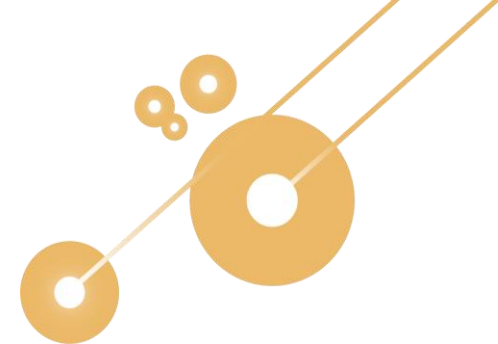
Addressing the geothermal resource risk

Geothermal project development financial profile

- Challenge: Much of the investment must be spent before the risk decreases
 - Drilling: 50-70% of project development costs
- Capital intensive project: uncertainty and risk impacts capital costs
- Private derisking require a low enough level of risk
 - Progress in exploration
 - Experience
 - Comparability

Public schemes can bridge that gap



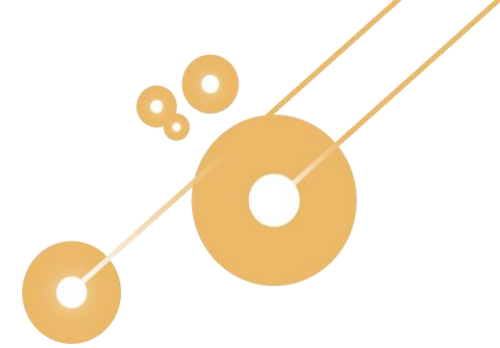


Addressing the geothermal resource risk

Physical reduction of the risk

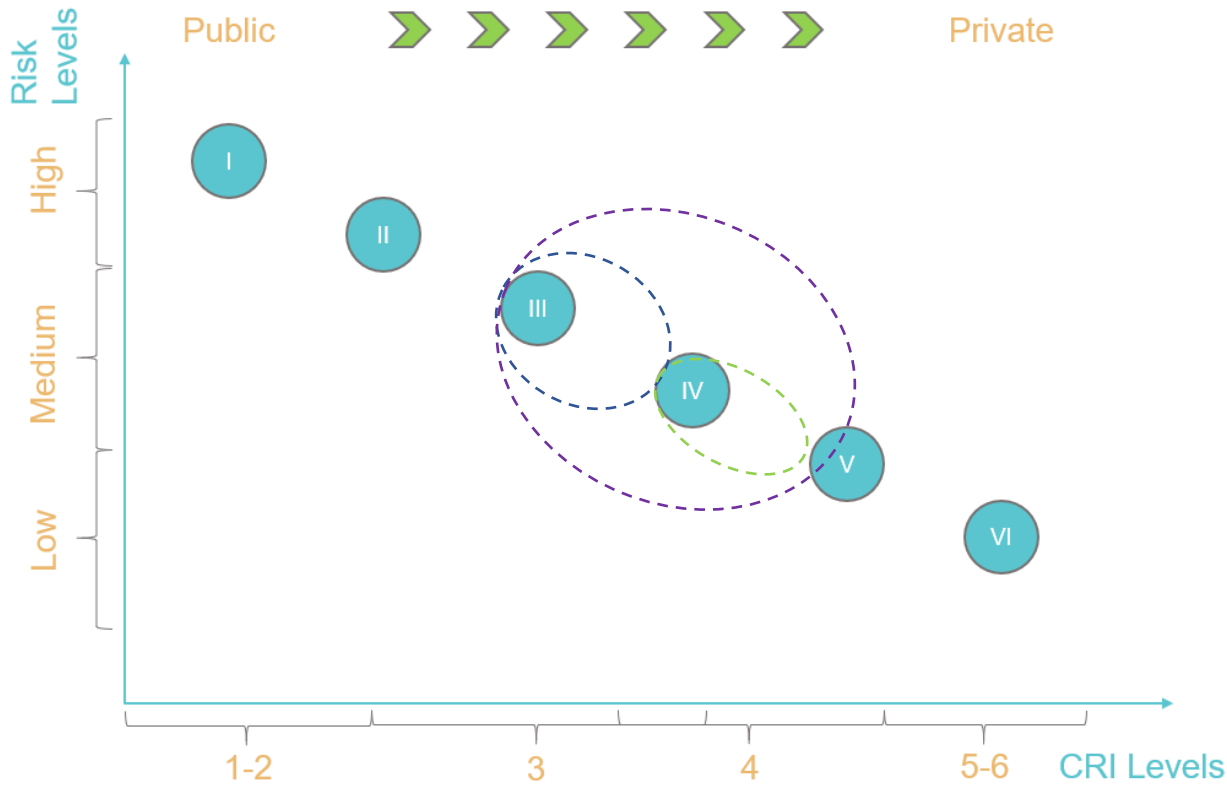
- Publicly funded geothermal resource exploration campaigns: increases the available amount of information, and therefore decreases uncertainty on the resource
- Investments in R&I for exploration
- Availability of geological information for developers

At the EU level, programmes such as TEN-E, Connecting Europe Facility can support such initiatives

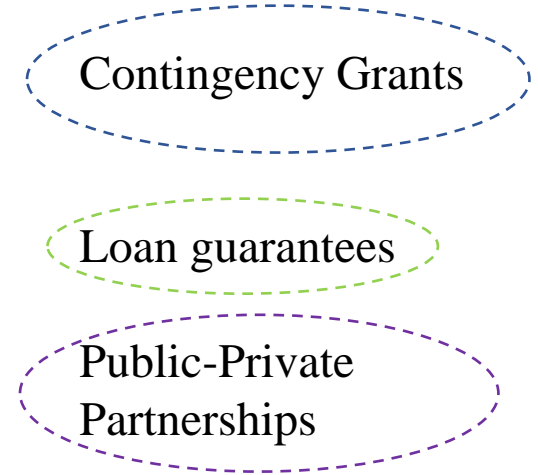


Risk mitigation adapted to market maturity

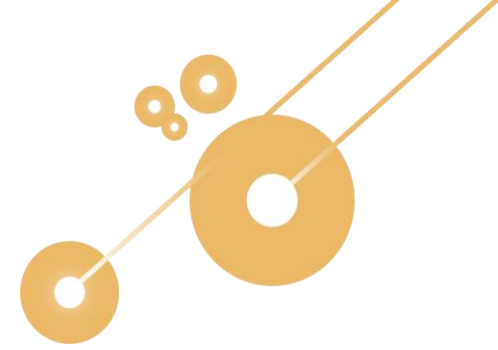
Tailoring Geothermal Derisking to Market Maturity



- I. Grants
- II. Convertible grants
- III. Repayable grants
- IV. Public insurance scheme
- V. Public-Private Partnership
- VI. Private RMS



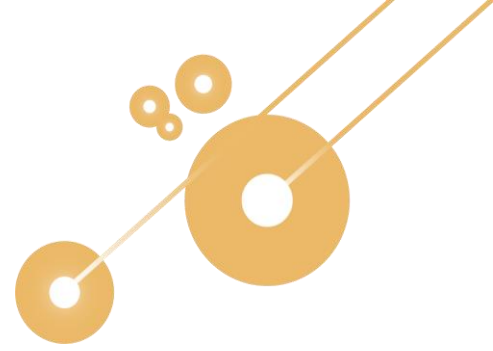
Waterfall structure of Commercial Readiness Indicator and Risk Mitigation Schemes



Addressing the geothermal resource risk

The role of support schemes

- Support schemes are crucial tools of public policy for geothermal to compensate for market failures and to allow the technology to progress along its learning curve
- Market failures and unfair competition prevent full competition in the electricity and heat markets
- Innovative financing mechanisms should be adapted to the specificities of geothermal technologies and according to the level of maturity of markets and technologies
- Geothermal Risk Insurance Fund is seen as an appealing public support measure for overcoming the geological risk. As costs decrease and markets develop, the private sector will be able to manage project risks, for example with private insurance schemes, and attract private funding
- Support scheme design should take a holistic approach, which goes beyond the LCoE and includes system costs and all externalities



Conclusions: main solution for developing geothermal heating and cooling projects

- Local planning provides visibility to developers
- Resource mapping provides key information to policy makers, investors and developers alike
- Establishing the right business models is crucial to successful developments
- Existing market structure and the dominant position of some technologies or energy sources must be accounted for
- Support schemes enable the émergence of a robust geothermal heating and cooling industry
- The right derisking scheme allows to adress the challenge of the geothermal resource risk while enabling competitiveness



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