



## DEEP GEOTHERMAL UK – UNITED DOWNS PROJECT, REDRUTH

***GEOHERMAL ENGINEERING LTD***

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***Ground Source Live. June 8<sup>th</sup> 2011***



### Potential

- Electricity, 35 TWh (by 2050 - DECC) ~ 5GW
- 10% of current UK demand
- Heat – not fully assessed: up to 30% of UK demand

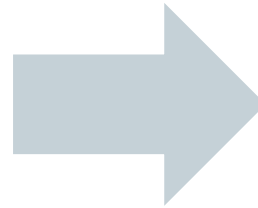
### Location

- Cornwall potential 3GWe (DECC)
- Scottish granites – NE (Newcastle)
- Sedimentary basins
- Grid connections/ Heat infrastructure?

### Technology

- Review of resource potential to start in summer 2011
- Can HDR, EGS, Deep Geothermal deliver?

## DEEP GEOTHERMAL – UK



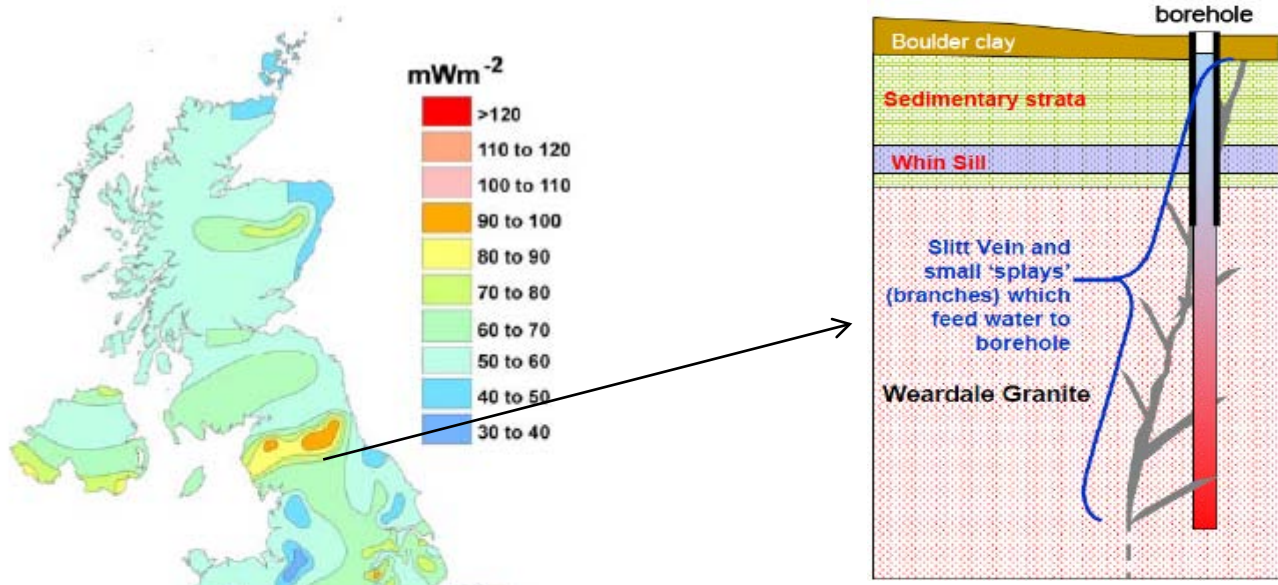
Definition/ Resource

Subsidies/ Grants/ Legislation

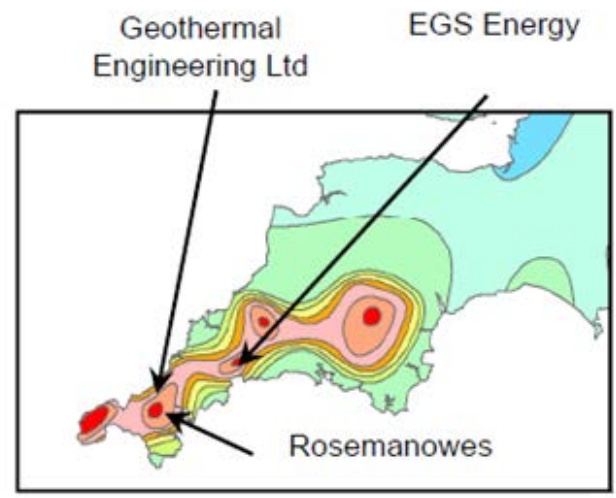
Deep Geothermal Industry



# RESOURCE AND DEVELOPMENTS (2011)



Heat flow map.



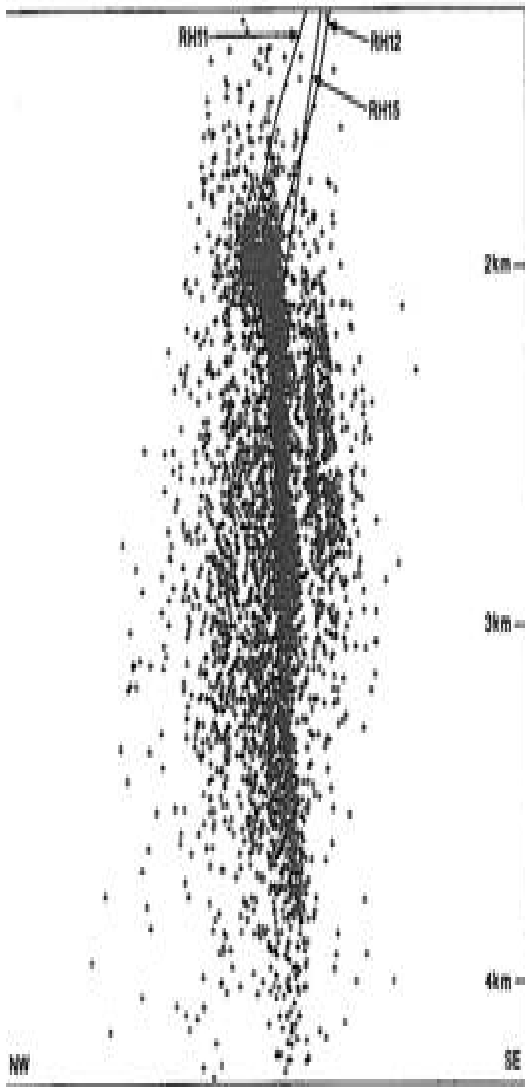
- Rosemanowes Quarry
- Early 1970s to early 1990s
- Govt and EU support (~£50m)
- Shallow system ~ 300m
- Deep system ~ 2,500m (3 wells)
- Full scale field experiment to develop reservoir creation and monitoring techniques
- Not commercial temperature



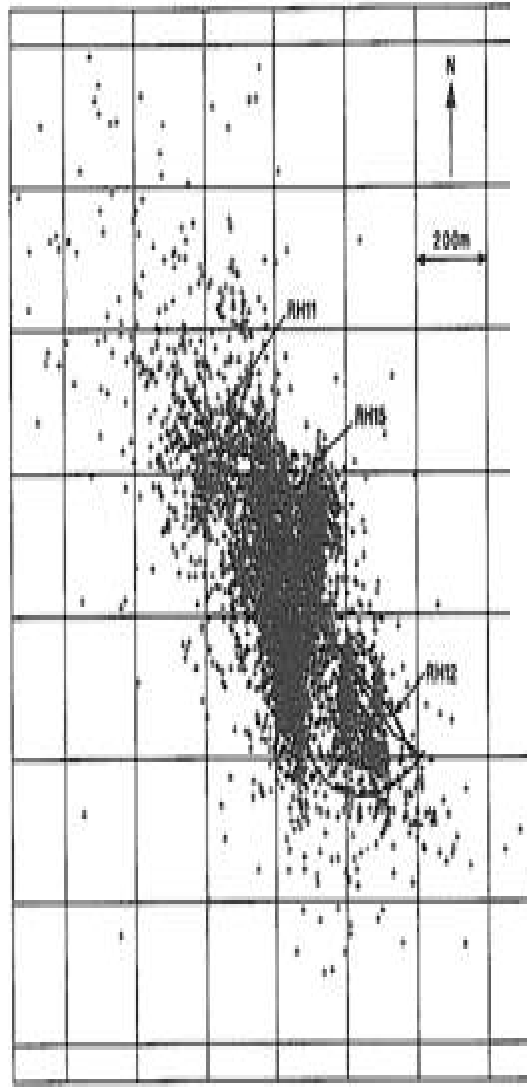
# UK HISTORY – HDR PROJECT - EXPLORATION



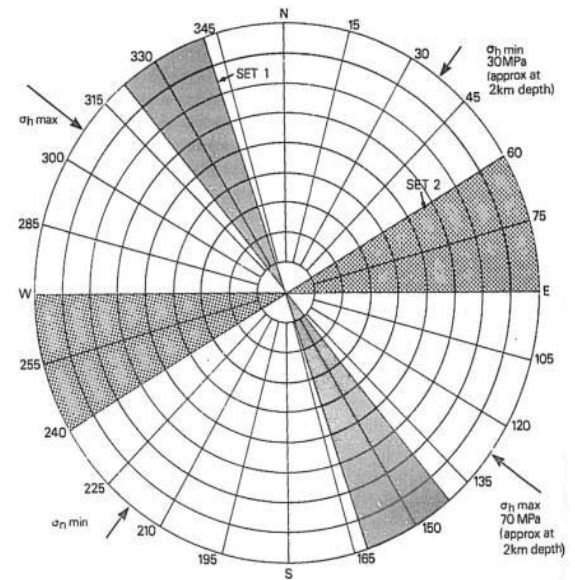
# LESSONS LEARNT



Profile NE-SW

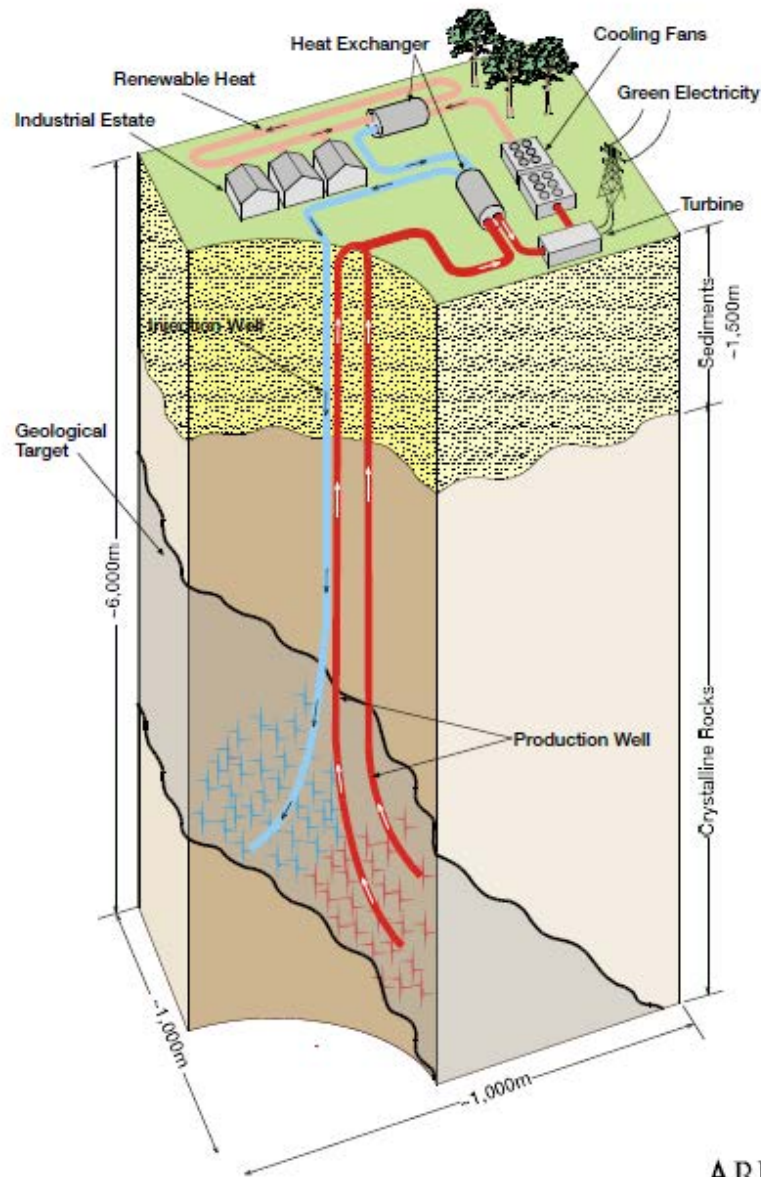


Map view



**Shmax**

## UNITED DOWNS PROJECT – SCHEMATIC



## UNITED DOWNS POWER PLANT – MAIN FEATURES

United Downs Industrial Park, near Redruth, Cornwall

- 10 MW electric (7MW net) ~ 55 MW thermal

Target depth: 4.5kms

- Temperature ~ 190 C

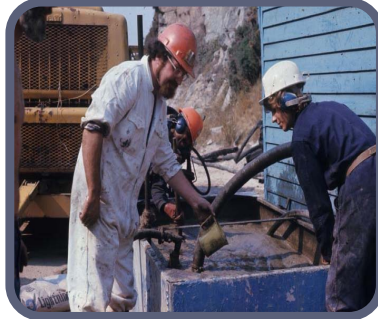
Drilling 2012

- Power production 2015

Project cost ~ £50m



# PROJECT STAGES



## Pre-exploration

Site selection  
Planning  
Permitting  
PR

## Exploration

Geophysics  
Exploration wells  
Stimulation  
Microseismic

## Drilling

Stimulation  
Reservoir creation  
Circulation  
Plant optimisation

## Power production

Grid connection  
PPA  
Renewable Heat



Decreasing risk

# COMMUNITY RELATIONS



Local residents at the meeting at the site in United Downs who are concerned about noise.

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## Rocky start to 'green' energy from residents

By JULIAN RIDGE  
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A PROPOSAL to produce large quantities of "green" electricity using heat from deep under the earth's surface was given a rocky ride at a public meeting near Redruth.

About 50 people gathered on a small plot of land on United Downs Industrial Estate for a demonstration of the noise levels likely to be experienced by residents living closest to the proposed drilling operation, should the project be given planning permission.

Geothermal Engineering Ltd



Ryan Law, MD of Geothermal Engineering Ltd (centre in the yellow jacket) listens to the concerns of the locals.

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ioned rig. We have now narrowed down the rig we will use to a choice of two, both of which are more modern and should be even quieter.

Mr Ledingham also explained that a by-product of the electricity generation process would be hot water, which would be made available free of charge at the power plant site for any organisation that wished to exploit it.

"Cornwall has the opportunity to lead the country in the development of renewable energy and to develop its low carbon economy by capitalising on renewable heat for industry, agriculture and



Community Involvement

Consultations

Media

Finance

Education

Groups

## UK – DEEP GEOTHERMAL FINANCIALS

### ROC

- Renewable Obligation Certificate on NET electricity, in addition to wholesale
- ~£0.05 per kWh
- Deep geothermal currently 2\*ROCs ~ £0.10 per kWh

### RHI

- Renewable Heat Incentive
- Subsidy for use of renewable heat at site. Potentially in addition to any heat sale
- Deep geothermal currently £0.03 per kWh

### Total

- Wholesale electricity
- 2\*ROCs
- Electricity revenue £0.14 per kWh ~ €0.16 per kWh
- Heat sale on top



Grants (match/ R&D)

VC or Private Equity

IPO/ Debt

RETURNS

RISKS

Subsidies

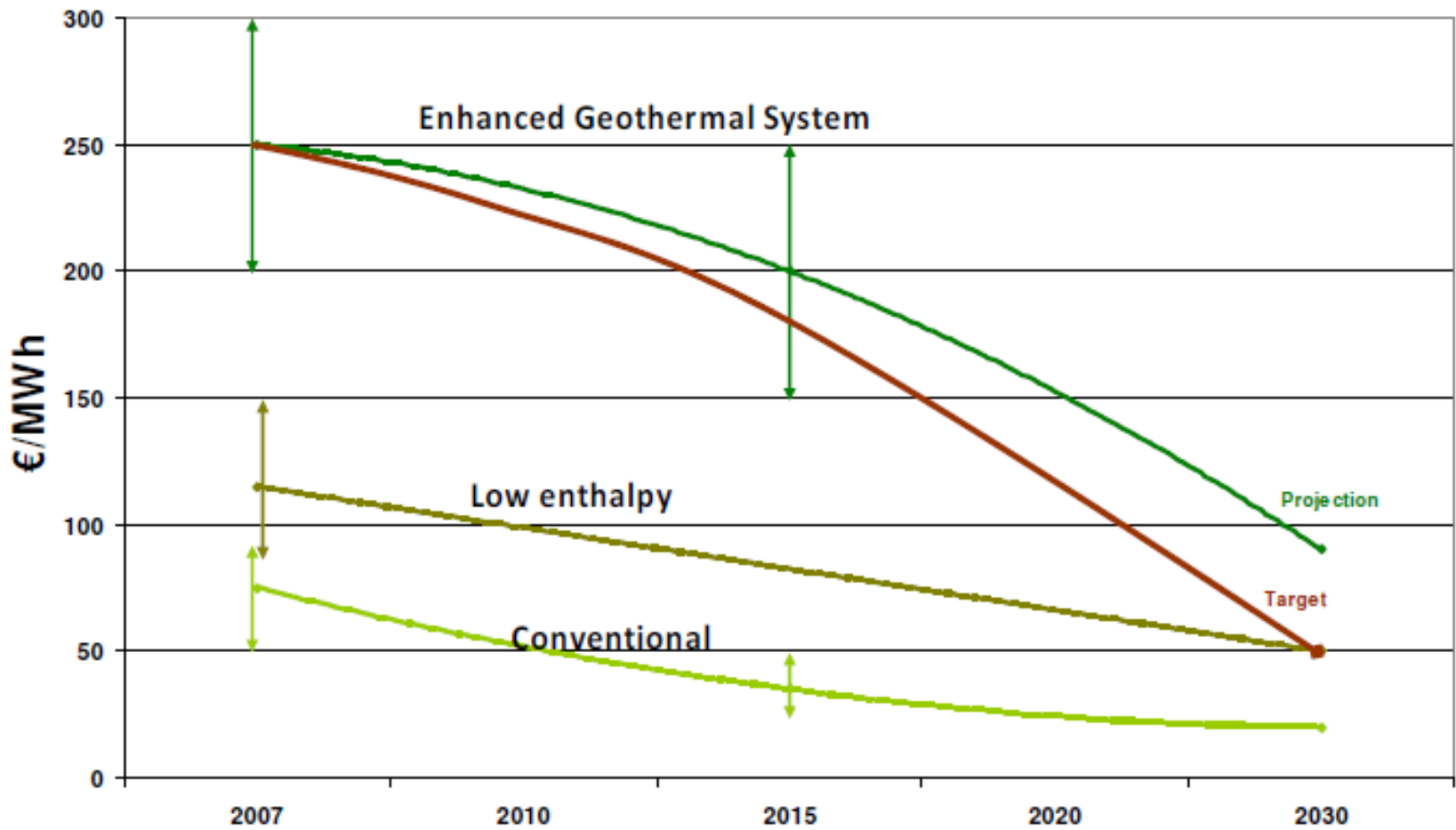
Trust?

Temperature

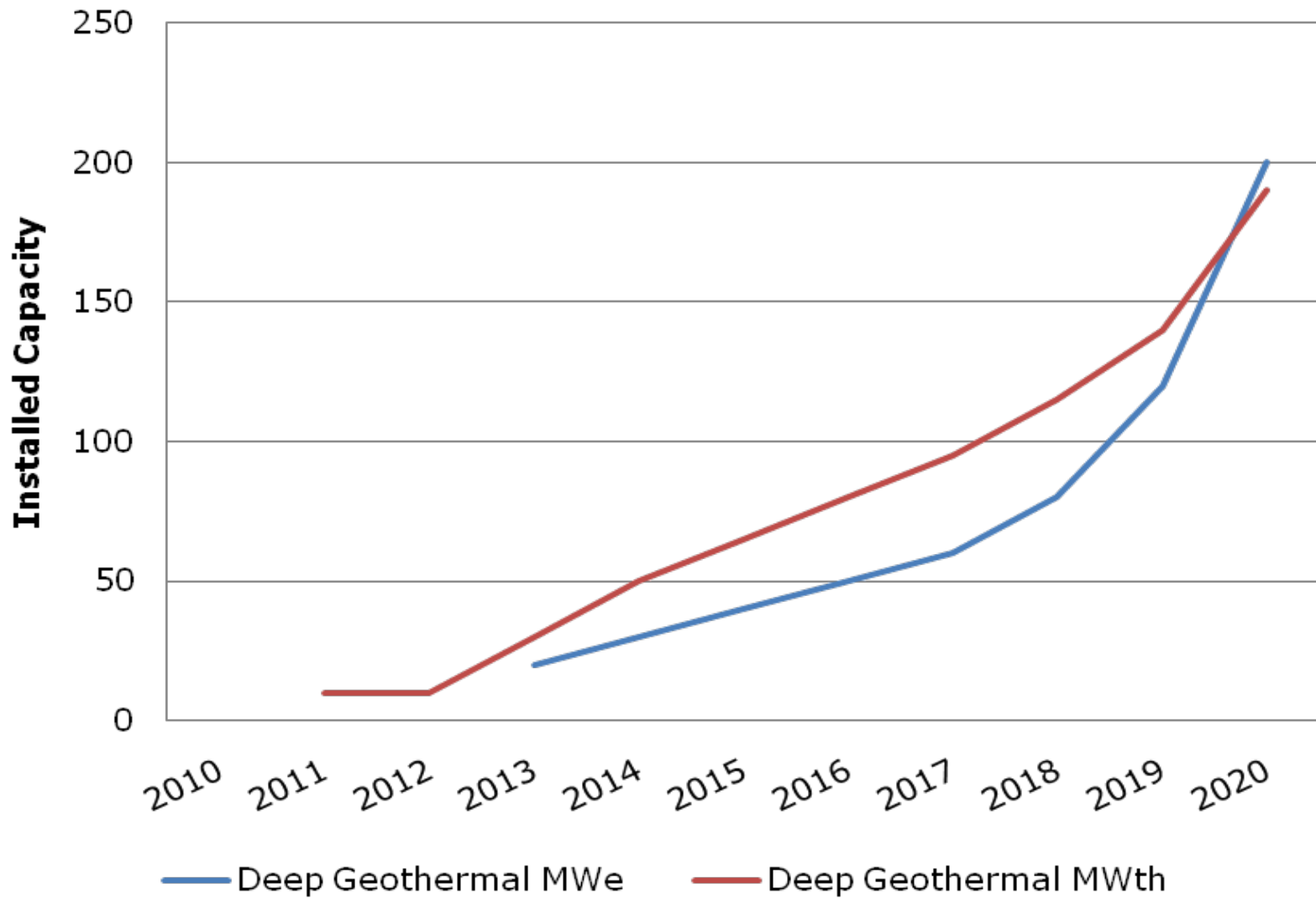
Permeability

Drilling

# FUTURE GEOTHERMAL COSTS



## FUTURE CAPACITY



## GEOTHERMAL FUTURE

### European outlook

- Good resource/ technology base
- Dense network of towns and cities – community demands for heating and cooling
- Increasing consensus on industry needs – tariffs, geothermal licences, exploration risk insurance schemes

### What needs to be achieved

- Reduction in drilling time and costs
- Manage all aspects of seismic risk
- Continue to convince politicians and community groups of project value
- PROVE large scale projects over meaningful time periods

### UK needs

- Geothermal licences
- Appropriate tariffs: 4\*ROCs + RHI of £0.05 to compete with other countries (notably Germany)