

# The Geothermal Prospects for the South-East Cheshire Basin: A Geological, Sociological and Economic overview.

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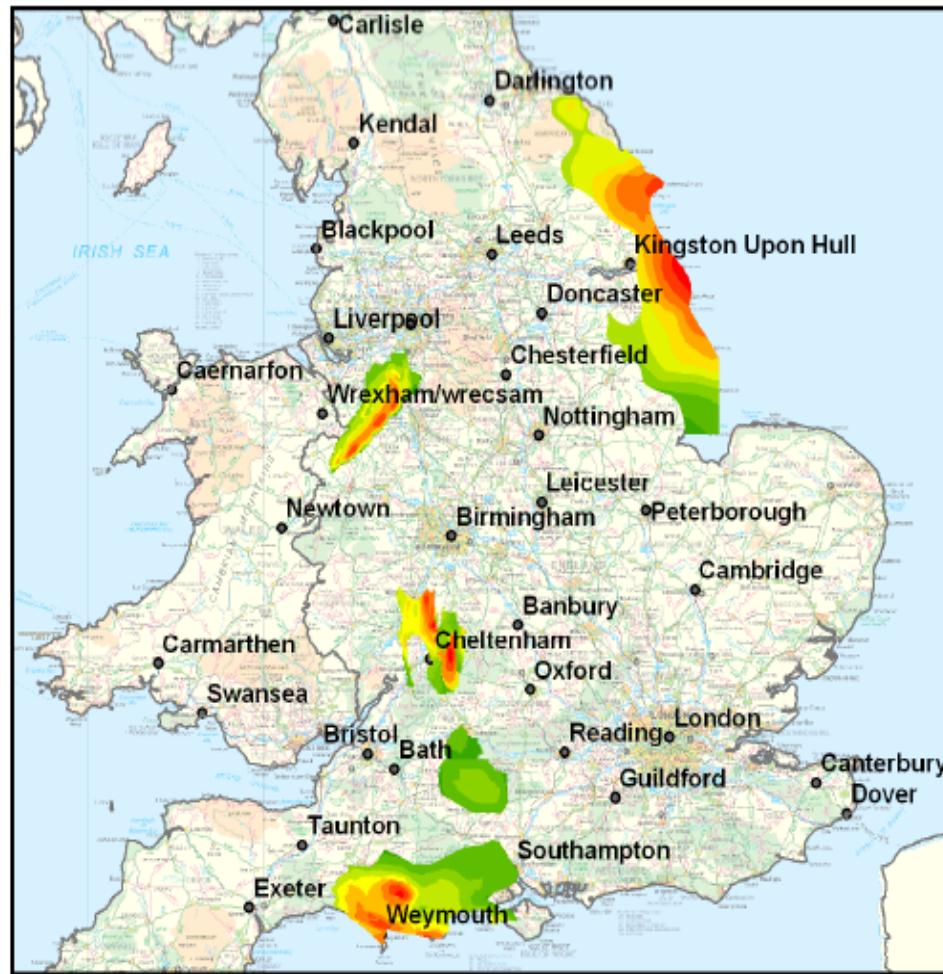
# Geothermal Energy Iceland Style?



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# Main UK Low Enthalpy (ie sedimentary Geothermal Prospects) after Busby



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# UK Geothermal Resources

Basin	Aquifer	Area km <sup>2</sup>	GR (1988) 10 <sup>18</sup> J	GR (1994) 10 <sup>18</sup> J	IR 10 <sup>18</sup> J	T °C	TS GJ/m <sup>2</sup>
Eastern England	SSG Triassic	4827	99	122	24.6	65	60
Wessex	SSG Triassic	4188	23	27	6.5	95	18
Worcester	SSG Triassic	500	12	8	1.5	55	35
Worcester	BS Permian	1173	-	60	11.8	65	110
Cheshire	SSG Triassic	677	17	36	7.6	80	75
Cheshire	CS Permian	1266	28	38	9.1	100	60
Northern Ireland*	SSG Triassic	1618	35	35	4.7	60	25
<b>Total</b>			<b>214</b>	<b>326</b>	<b>65.8</b>		

GR Geothermal Resources >40° C  
 IR Identified Resources: resource available for development at a reject temperature of 25° C and a recovery factor of 0.33  
 T Maximum temperature  
 TS Maximum thermal store  
 \* Northern Ireland resources not revised, (IR for reject temperature of 30° C and recovery factor 0.25)  
 SSG Sherwood Sandstone Group; BS Bridgnorth Sandstone; CS Collyhurst Sandstone.

BGS © NERC

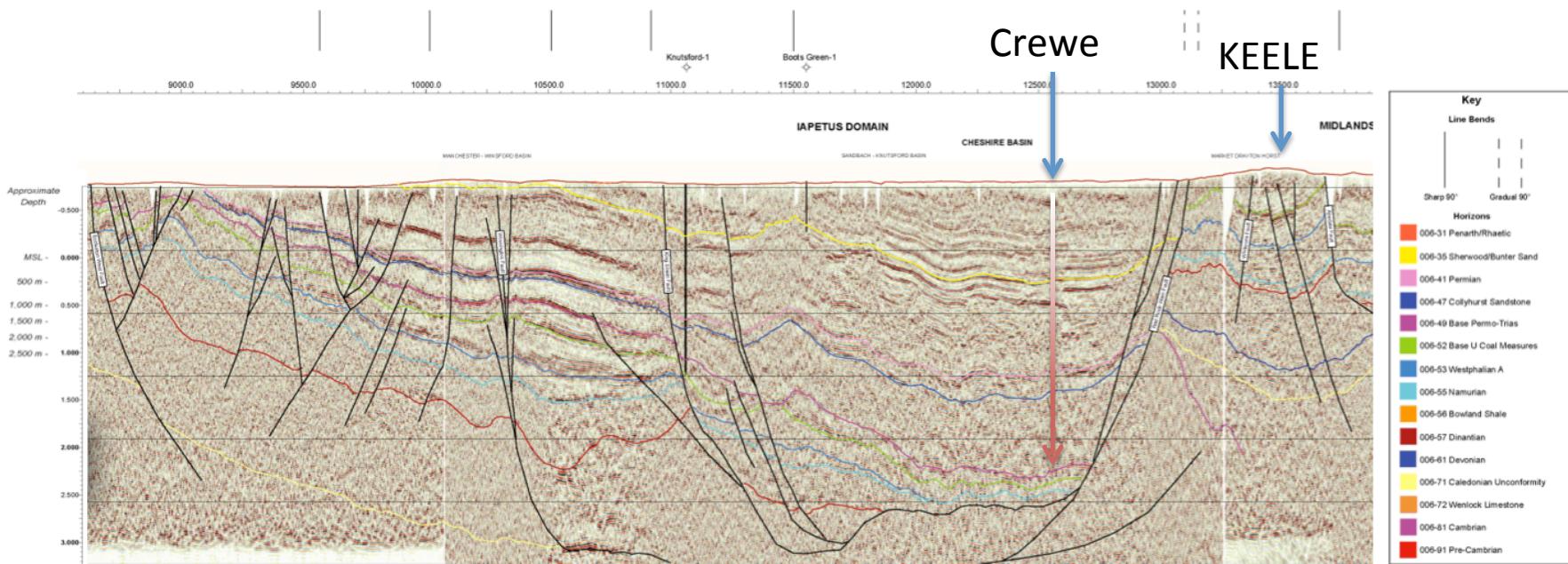
Summary of the UK's low-enthalpy geothermal resources above 40 °C.



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# NW-SE Seismic Profile across the Cheshire Basin



Millot et al. (1946) assessed maturity from coal rank data in Keele 1 well, drilled in the Potteries Coalfield on the margin of the Cheshire Basin. Their depth-maturity plot reveals that the geothermal gradient in Keele 1 may have been as high as 81C/ km in early Westphalian times, declining to 29-45 C/ km in late Westphalian times.



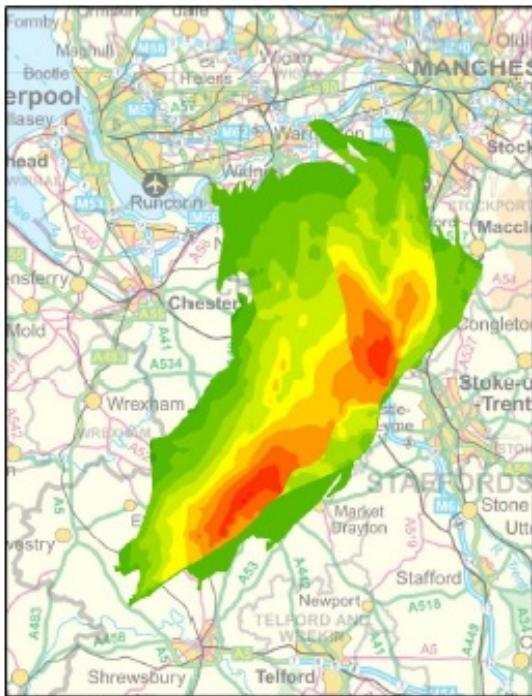
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# Calculated temperatures, Cheshire Basin

Temp °C

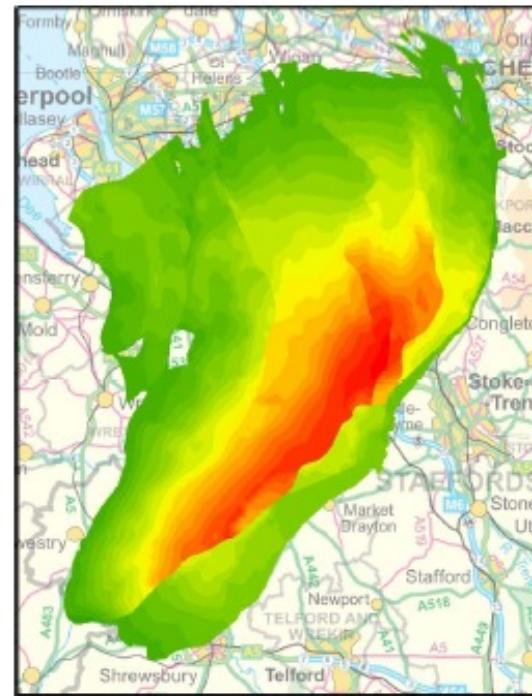
- 8 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60



Top of Sherwood Sandstone Group

Temp °C

- 8 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- 85 - 90
- 90 - 95
- 95 - 100
- 100 - 105



Base of Permian sands

Calculated temperature models at the top and base of the principal aquifer formations in the Cheshire Basin

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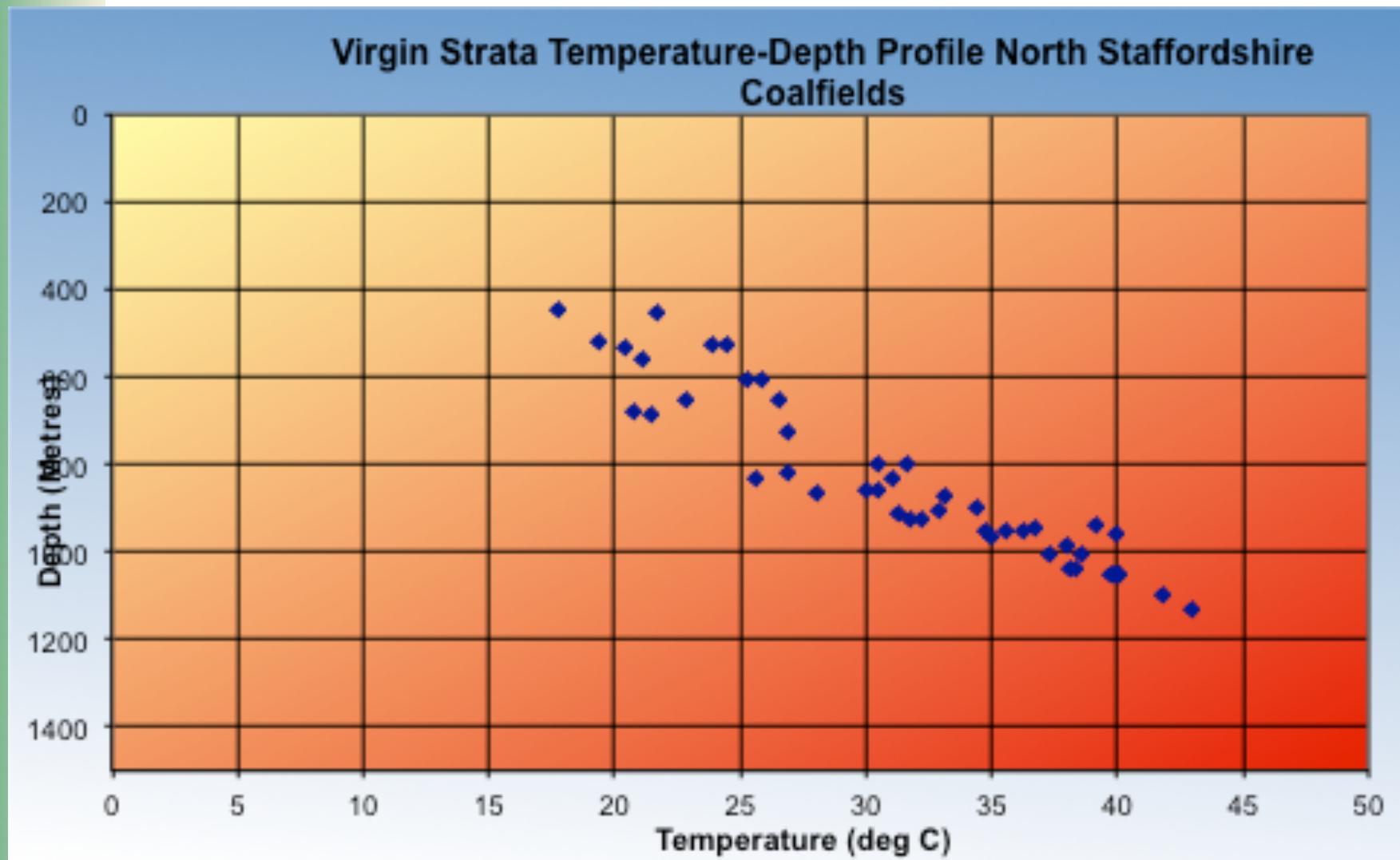


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# Why South East Cheshire is so fortunate



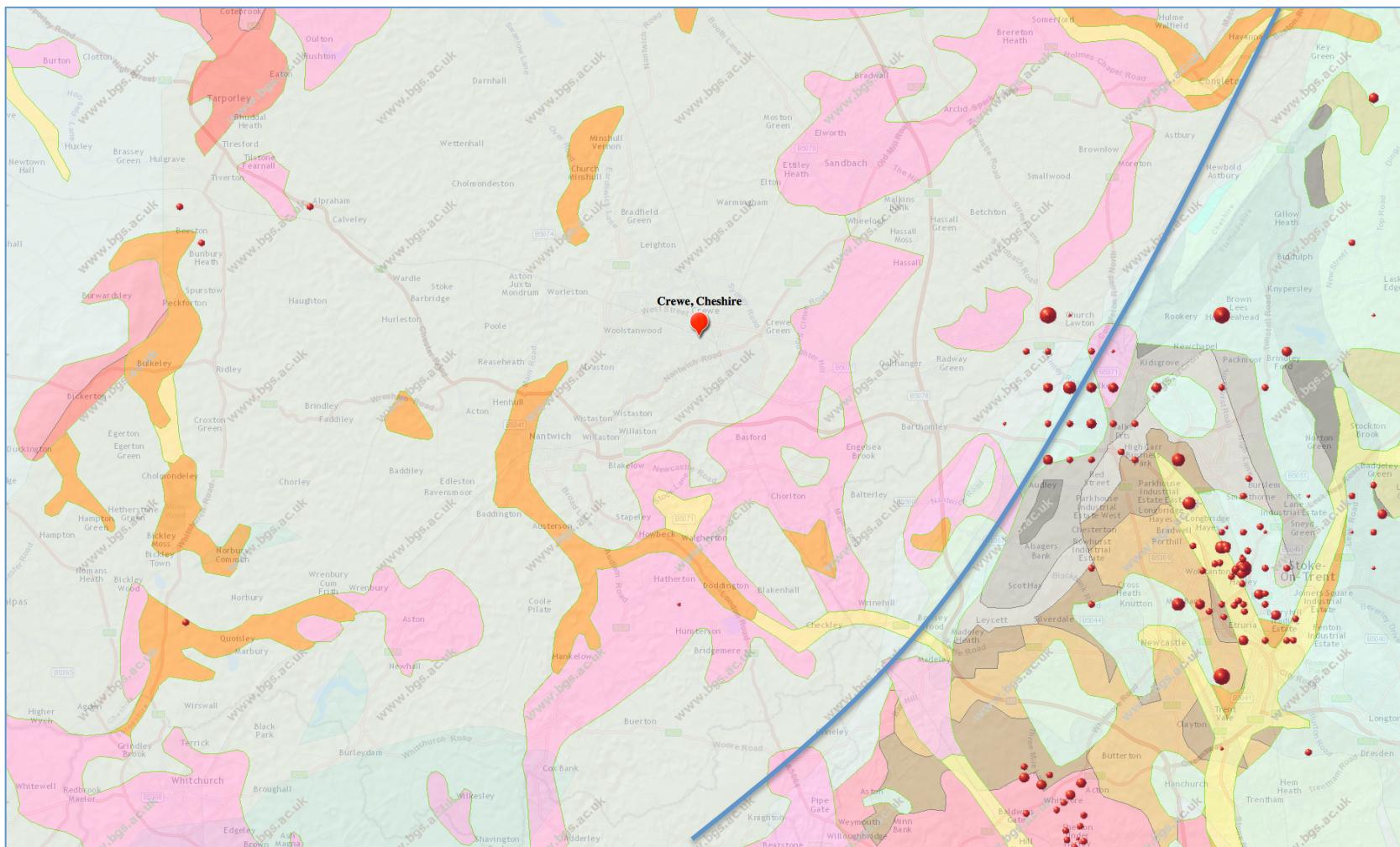
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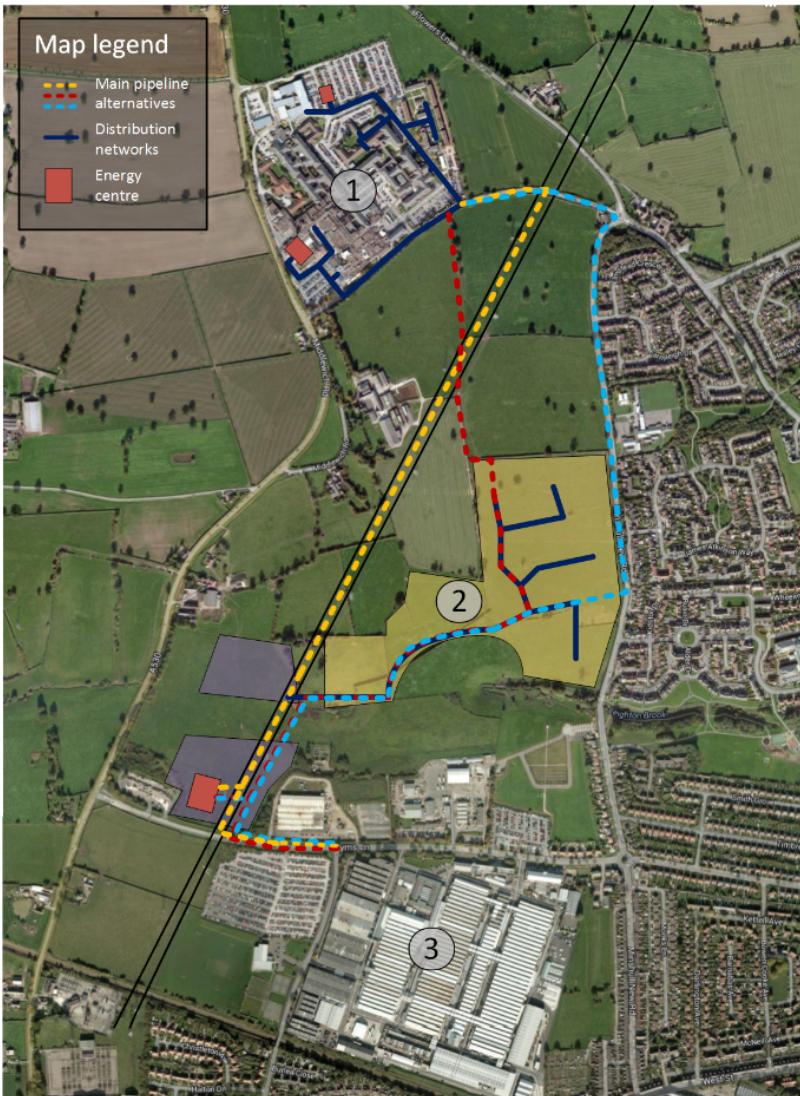
# Principal Faults in the Crewe Area



# Cheshire Seismicity 1970 to 2014



# Ambitious Plans for Crewe



- £198k from HNDU to carry out feasibility work
  - Significant public and private sector heat loads
  - Strong local political support
  - Supportive planning regime
  - Potential to expand to Crewe Town Centre in future phases and supply HS2 developments
- BUT – the industry is not yet ready to deliver**



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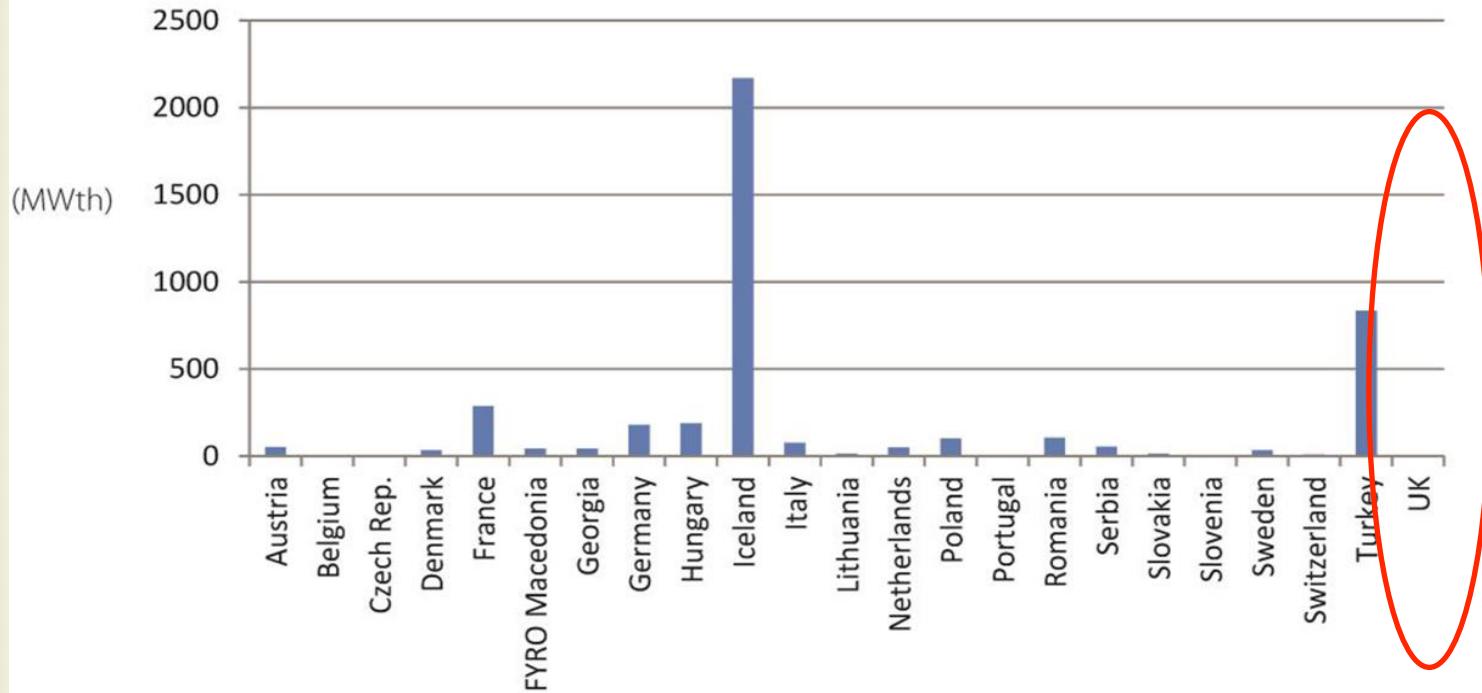
# Volume of Resource

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- British Geology Survey 1999 estimates the water underneath Cheshire holds around 4.6m Giga Watt hours of energy (GWh) (4,600,000,000,000kWh)
- The total annual UK heat demand is circa 700,000 GWh
- Strong academic research provides conservative estimates that under Crewe the temperature of water is 48 °c at 1,500m and 95°c at 3,300m
- Research indicates that Cheshire East and Crewe are prime sites for commercial exploitation.



# How can we get beyond this point?

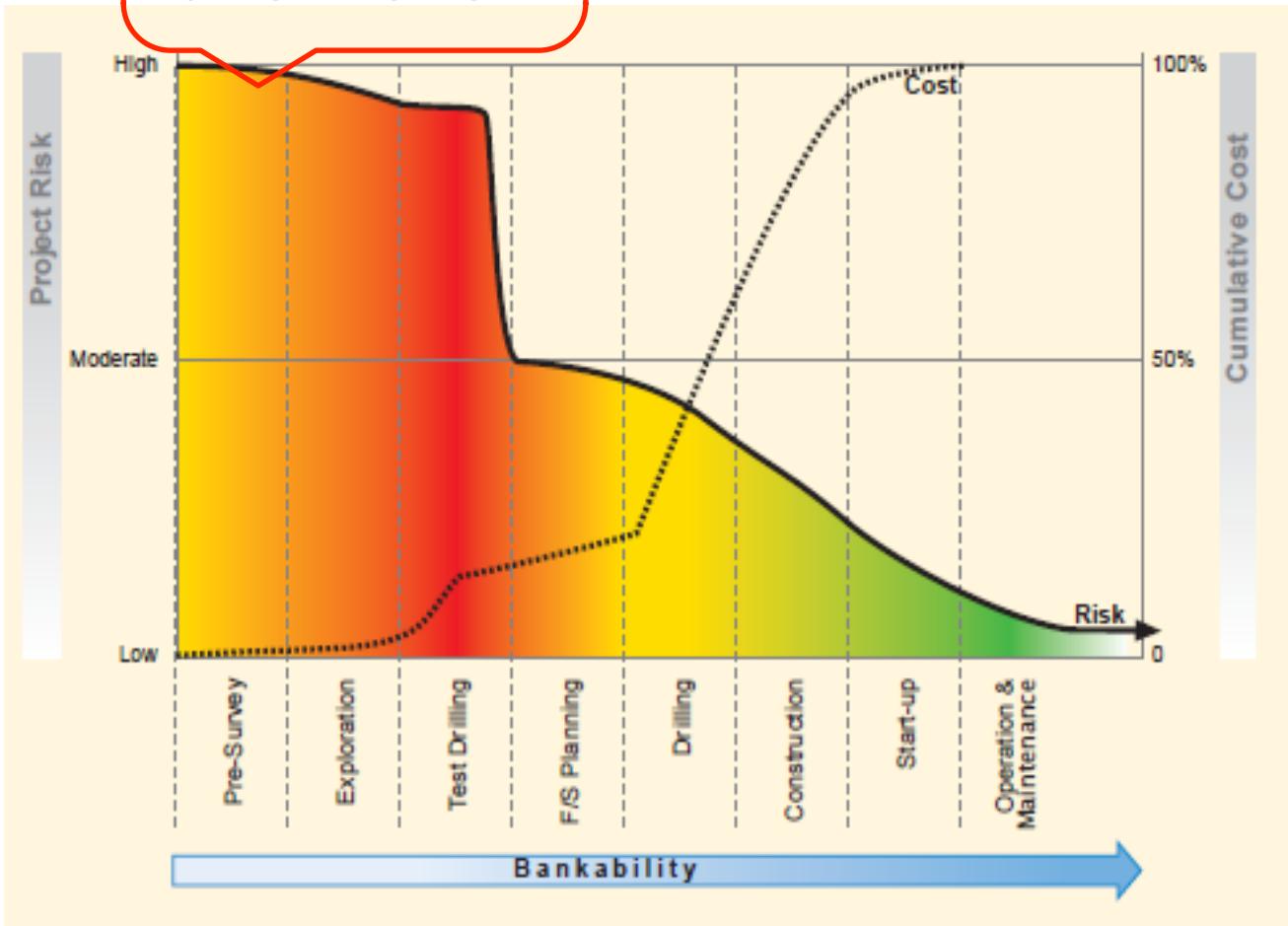


Source: Geothermal District Heating Market Development V.2 (GEODH March 2013)



You/we  
are here

Source: Geothermal Handbook Planning and Finance, p.69 Technical report 002/12, Energy Sector Management Assistance Programme



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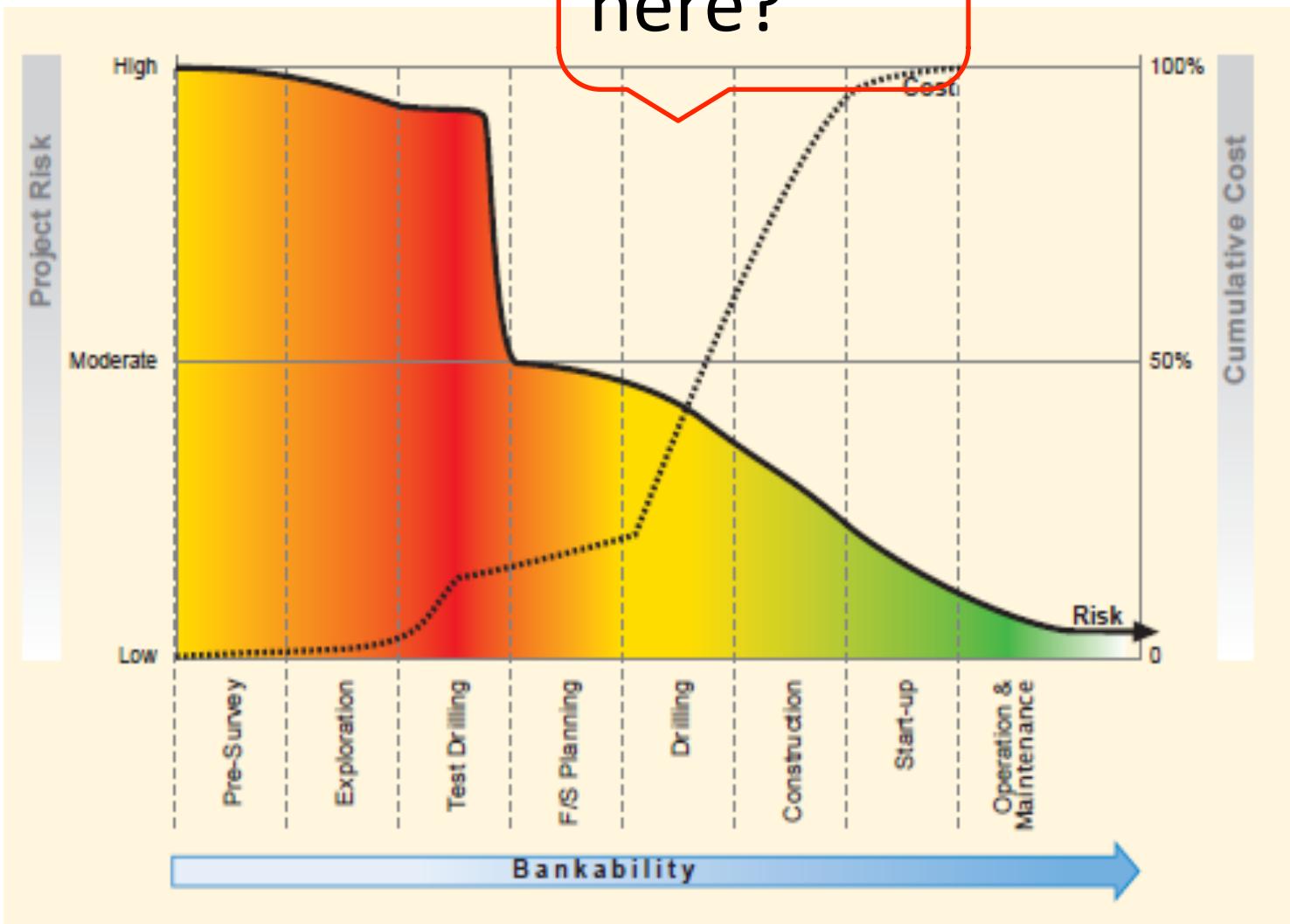


# A Local Authority at the Vanguard

<p><b>Partnership with leading academics</b> to further explore the geological potential</p> <ul style="list-style-type: none"><li>• Sponsored PhD students</li><li>• Masters projects</li></ul>	
<p><b>Partnerships with colleagues at Durham and Cornwall Councils</b> to identify and unlock common barriers</p>	
<p><b>In-principle commitments from heat loads</b> subject to commercial offer</p>	
<p><b>Detailed independent study on the feasibility of the district heating network</b> and how it can expand in future phases</p>	
<p><b>Investigating innovative approaches to exploration risk</b></p> <ul style="list-style-type: none"><li>• Tax concessions or <b>business rates subsidies</b> to provide indirect funding?</li><li>• ERDF- funded risk pot?</li><li>• Partial risk insurance solution from the market?</li><li>• Direct Council investment?</li><li>• Government investment?</li></ul>	



Moving to  
here?



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# Any questions?

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