

# Minewater and HSA Geothermal Business Opportunities



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5<sup>TH</sup> UK DEEP GEOTHERMAL SYMPOSIUM – 25<sup>TH</sup> OCTOBER 2016

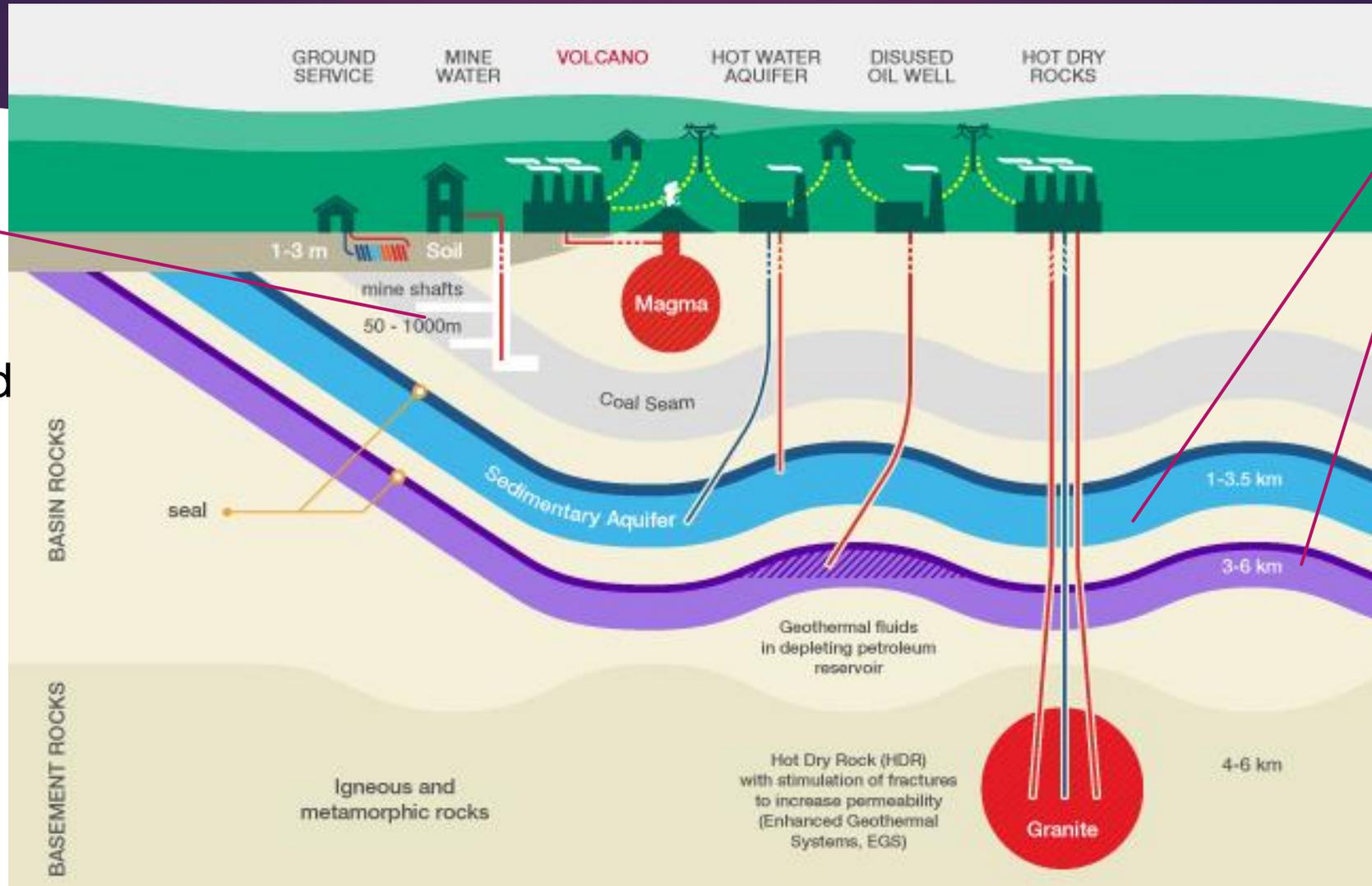
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# Town Rock Energy



- **Award winning** consultancy in year four with **big aspirations** and a **global network**.
- **Cross-sector** and **cross-disciplinary** projects introducing a **new industry** to Scotland.
- **Visionary graduates** enabled by a team of **highly experienced associates**.
- Sustainable, affordable, reliable, very-low-carbon 24 hour renewable heat on demand.
- Very little visible surface infrastructure and near to areas of demand and fuel poverty.

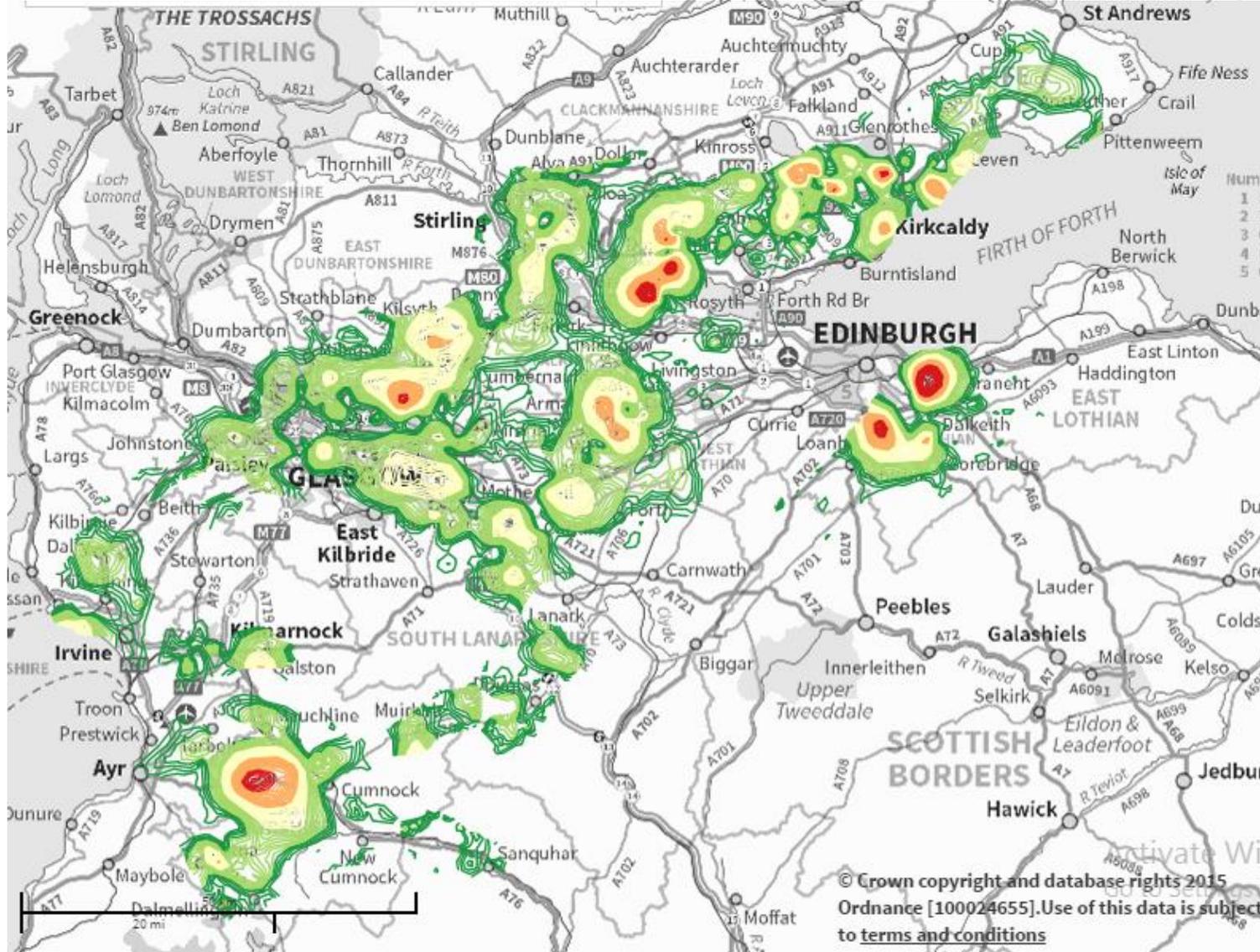
# Geothermal Resources



**Mines:**  
1/3<sup>rd</sup> of all Scotland's heat demand could theoretically be supplied from heat within flooded coal mines.

**HSA's and depleting oil reservoirs:**  
Sedimentary aquifer resources in the Central Belt and depleting North Sea oil reservoirs are abundant untapped geothermal resources

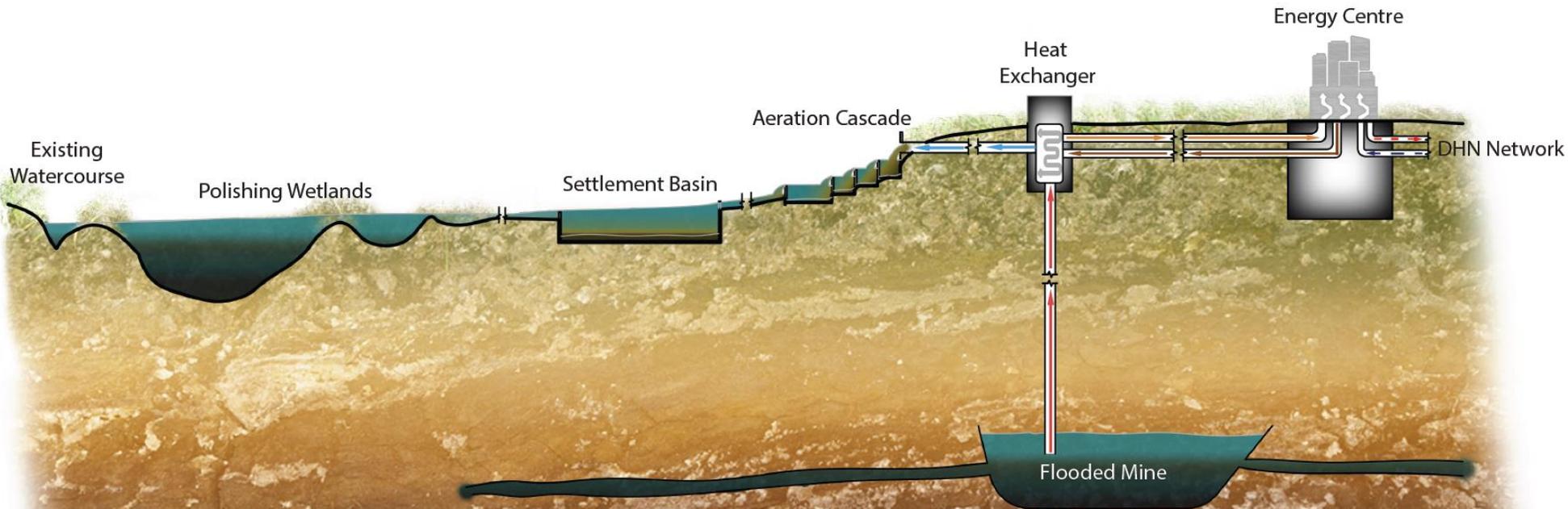
# Scottish Minewater Opportunity



## Worked example:

- ▶ Evaluated all possible heat options for DHN in urban/industrial area.
- ▶ Preferable option is minewater geothermal providing all heat:
  - ▶ £18m capex;
  - ▶ Capital grant funded DHN pipework;
  - ▶ 15% IRR.

# Fortissat, N. Lanarkshire, Scotland



\* Purely representative - not geologically accurate or to scale \*

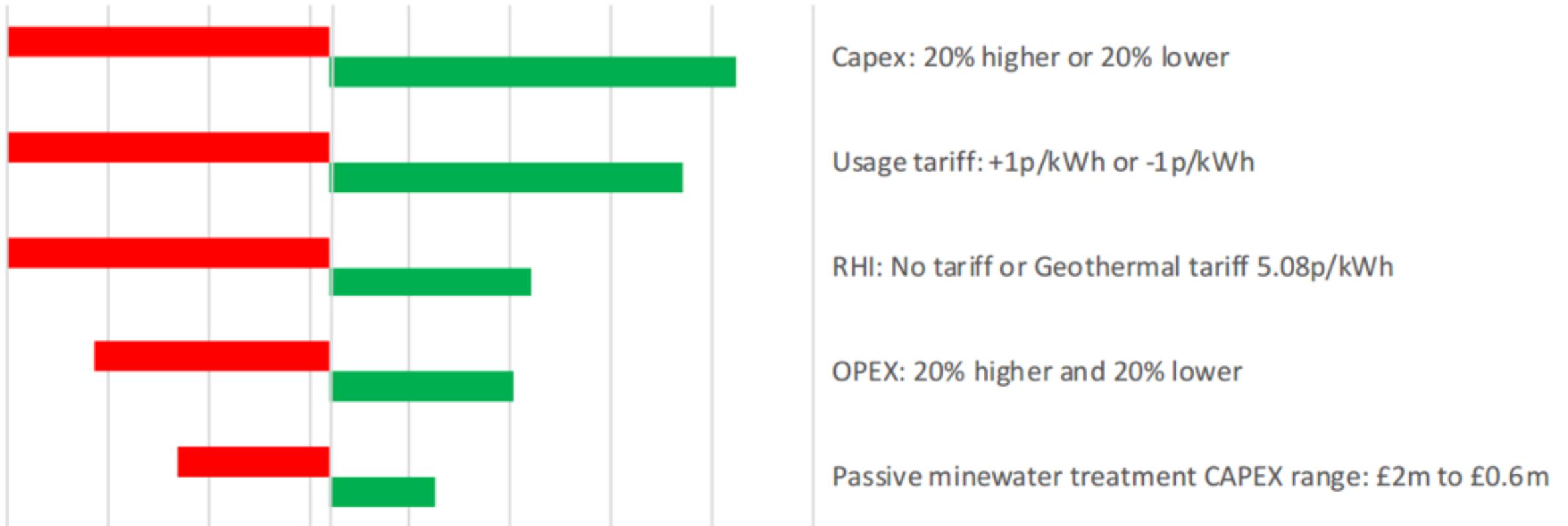
- ▶ **It Makes Sense:**
- ▶ clean-up of local surface minewater contamination;
- ▶ ex-mining community aware of heat within mine and suffer from fuel poverty.

# Learnings from Fortissat Community Minewater DHN Project Feasibility



- ▶ Rural district heating results in marginal economic case
- ▶ Larger heat network generates a higher IRR, and opportunities exist to add a large point heat consumer to dramatically improve economic return
- ▶ Private sector customers required
- ▶ Lower temperature (<65°C) network improves efficiency and economics
- ▶ RHI is integral; opportunity to improve with Geothermal vs WSHP RHI tariff
- ▶ Well pump test is required to finalise design, costs and possible project stop
- ▶ Carbon savings of 800 tCO<sub>2</sub>/year – will increase up to 2000 tCO<sub>2</sub>/year with 100% renewable electricity supply (ie. Scottish Government 2020 target)

# Minewater Economic Sensitivities

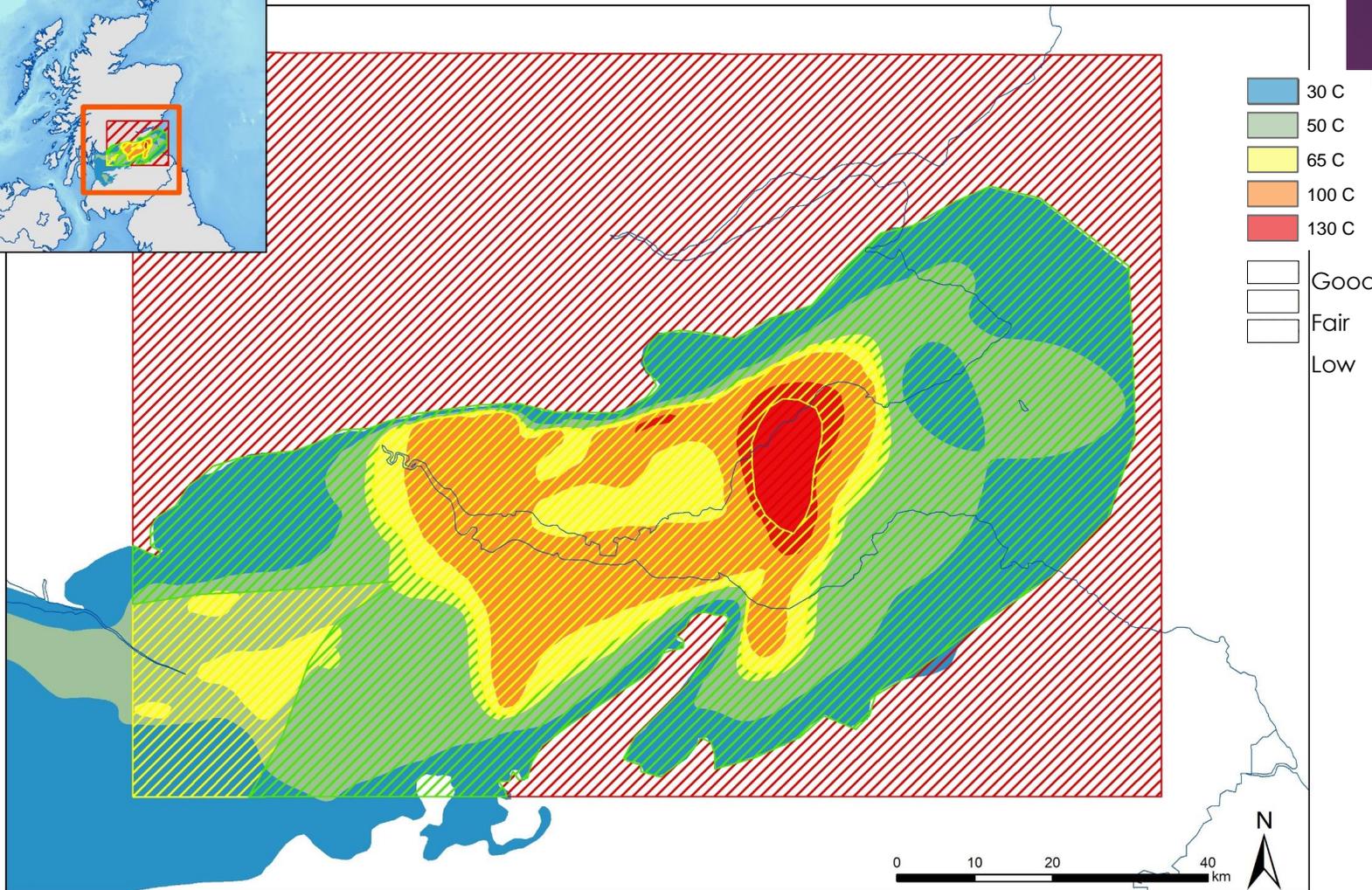
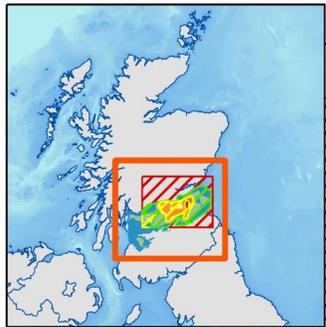


# Learnings from Banchory 'hot rock' & Guardbridge HSA deep geothermal projects



- ▶ Targeting an existing DHN for heat market does not always work – Banchory deep geothermal well outcompeted by extraordinarily cheap locally sourced biomass. Halted for now, but worth revisiting in-line with a biomass price increase or DHN expansion.
- ▶ Single private heat customer is far easier to progress than multiple private/public heat customers – local authority led networks can be a challenge; more heat customers = more challenging.
- ▶ Leveraging research and innovation benefits of drilling deep geothermal wells can enable progress – partnering with University of St Andrews Guardbridge Innovation Centre has proved beneficial.
- ▶ Reports available for download at:  
<http://www.gov.scot/Publications/2016/03/6881>  
<http://www.gov.scot/Publications/2016/03/3520>

# Scottish HSA Opportunity



## Bottom line success case:

- production well to 1500m depth
- flowing 20l/sec
- temperature of 55°C
- reinjected at 20°C
- doublet geothermal system has capex of £3m
- producing 15GWh pa (~£500k)
- at 75% use, will earn £750k pa RHI at 5p/kWh for 20 years
- low opex (<0.5p/kWh)
- 3 - 5 year payback
- saves 2500 tonnes of CO2 pa compared to gas fired boilers

# Where are we now with deep geothermal heat in Scotland?



- ▶ Minewater schemes are potentially very attractive at scale, especially when a few high heat demand customers can be identified and contracted into an ESCO.
- ▶ HSA geothermal potential is there, but scaled development requires change in the investment and risk management landscape: demonstrators might break through at Guardbridge, AECC, and others to demonstrate economic case for HSA and single well technology, and de-risk regional HSA geothermal play.
- ▶ Multiple stakeholders + marginal economics + “new technology” mindset + short-sightedness are consistent blockers to progress beyond desktop studies.

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Thanks for listening!

