APPENDIX 7(i)

Bromsgrove District Heat Network Project Summary

Drivers

- Bromsgrove District Council declared a Climate Emergency last year.
- It is important to urgently develop key infrastructure, to underpin the major changes that are needed.
- A well designed heat network would deliver a carbon saving within buildings at a scale not achievable by any other means.

Heat networks

- A heat network connects multiple consumers and supplies heat and power from a centralised energy centre, and can be tailored to reduced carbon emissions and energy costs.
- Decarbonising heat supply is generally challenging but a heat network can deliver deep and sustained carbon reduction in an area, through enabling the incorporation of low carbon technologies at scale, with flexibility to expand and include other low or zero carbon technologies over time.
- A wealth of information, evidence[1] and Case Studies[2] are available from central government, who have made Heat Networks a key part of their Clean Growth Strategy.[3] Heat networks are predicted to be a significant contributor to decarbonising heat (circa 18% of heat supply towards the 2050 UK target of net zero carbon).
- There is central government guidance and financial support towards planning and design of heat networks. There is no guarantee that this support will continue to be available in the long-term:
    - the Heat Networks Development Unit (HNDU)[4]
    - capital "gap" funding for commercialisation and construction of through the Heat Network Investment Project[5].

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[1] https://www.gov.uk/guidance/heat-networks-overview

[2] https://www.gov.uk/government/publications/heat-network-case-studies

[3] https://www.gov.uk/government/publications/clean-growth-strategy/clean-growth-strategy-executive-summary#our-clean-growth-strategy:

'**2 Rolling out low carbon heating**

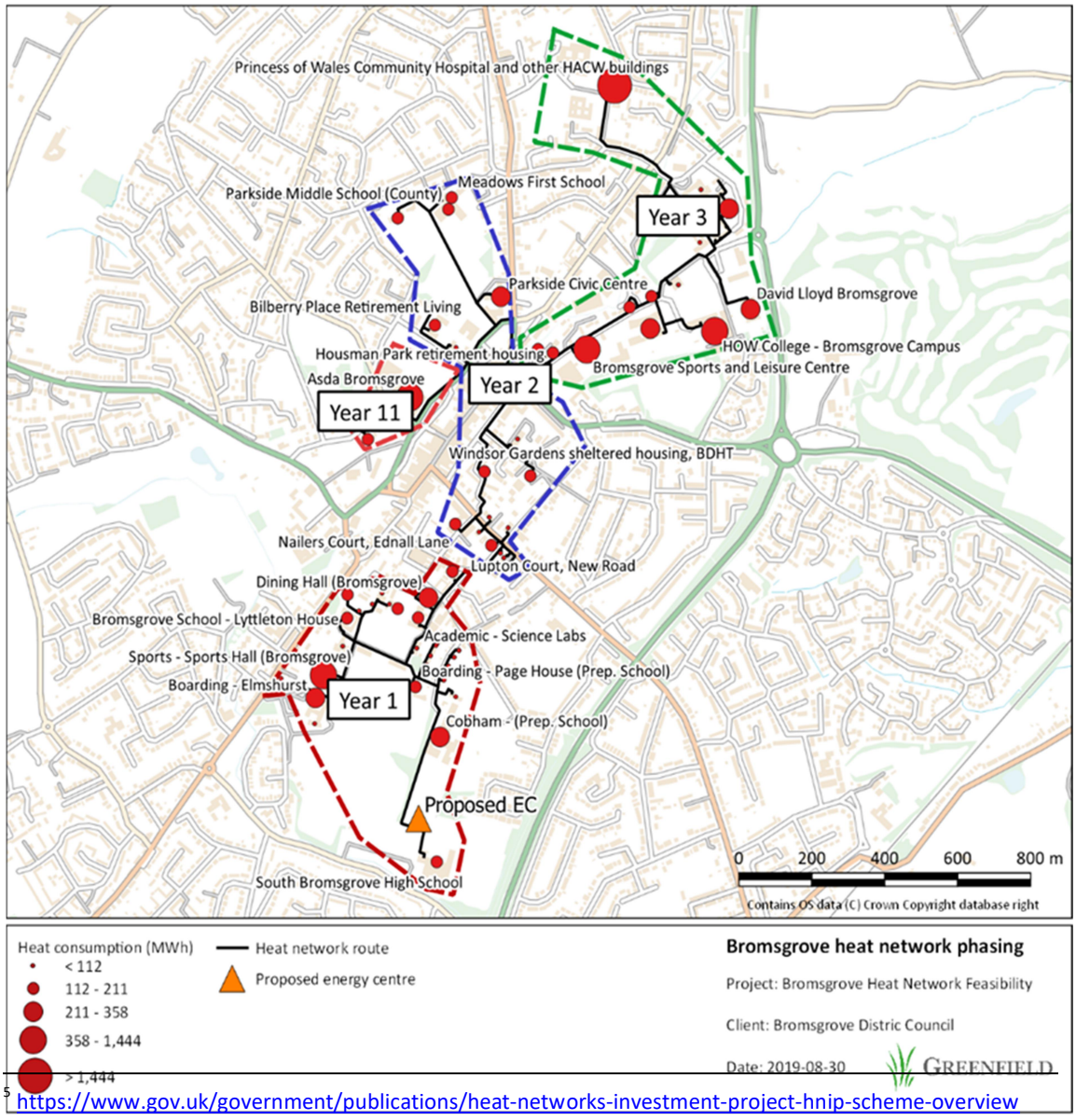
17) Build and extend heat networks across the country, underpinned with public funding (allocated in the Spending Review 2015) out to 2021

[4] https://www.gov.uk/guidance/heat-networks-delivery-unit

Bromsgrove studies

- An energy mapping and master planning study and a techno-economic feasibility study have been completed, showing the potential for a heat network to work in the identified area of Bromsgrove town (see Figure 1) .
- The work to date has funded through the Department of Business, Energy and Industrial Strategy (BEIS) Heat Network Delivery Unit (HNDU), Worcestershire LEP and North Worcestershire Economic Development and Regeneration unit (NWEDR).

Figure 1 Proposed heat network



[5] https://www.gov.uk/government/publications/heat-networks-investment-project-hnip-scheme-overview

Proposed Bromsgrove Heat Network

The network consumers identified cover retail, leisure, residential and healthcare establishments.

- Key stakeholders, with over 54% of the total annual heat demand are Bromsgrove School, Princess of Wales Community Hospital, Bromsgrove District Council and Bromsgrove District Housing Trust. They have already expressed interest in the future development of the scheme and expressed a willingness to commit financially to the detailed project development.
- A joint stakeholder project group will be necessary to drive the detailed project development forward and deliver any future outcomes.

Potential Benefits

- Provide new low carbon infrastructure that with effective management and the renewal of components as required will last indefinitely.
- Unlock the possibility of significantly reducing the town's carbon emissions. Initial estimates (with the consumers identified and technologies proposed) suggest an annual average of 1,560 TCO2.
- Deliver 5% reduction in heat related costs (i.e. energy costs plus reduced plant liability).
- Retain energy expenditure in the local economy (partially displacing gas and power exported from national networks). The scheme will generate in the region of £2.2m per year.
- Offer some protection against energy price volatility.
- Bring inward investment.
- Provide a potential opportunity for revenue generation for the council (and others) as owners/investors in the scheme. (The ownership and investment strategy between the key stakeholders will need to be resolved during Stage 2 of detailed project development, to determine how any commercial benefit would be shared.)
- Demonstrate that Bromsgrove District is open and supportive to low carbon technology and innovative enterprise.

Bromsgrove Heat Network Proposed Energy Sources

Technology

- A Ground Source Heat Pump (GSHP) system - boreholes sunk into the underground aquifer bring warm water (<15^{o}C) to the surface, where this to converted to higher/useable temperatures using a heat pump arrangement, which works like a refrigeration mechanism, in reverse. The marginally cooled water (typically 3-5 ^{o} C less) is then returned to the aquifer.

- Gas-powered Combined Heat and Power (CHP) unit - would generate electricity at the same time as heat, to supply Bromsgrove School and to supply electricity to power the GSHP. CHPs are common technology e.g. Bromsgrove Sports and Leisure Centre has a CHP.

- Gas boiler back-up sufficient to supply the whole network if needs be (and meet the peak demand in the depths of winter).

- From a long-term perspective, it should be noted that supply technology can be changed within a heat network; this is one of its key advantages. CHP emits less carbon than separate gas boilers and grid electricity, but is not a renewable technology. However, its relative cost effectiveness, in part from electricity revenue, can enable the initial establishment of the network infrastructure. Later on, e.g. after the lifetime of the initial CHP plant, lower carbon technologies can be introduced, when they may also be more cost-effective and the initial infrastructure costs have been paid down.

Location

- The GSHP, CHP, gas boiler back-up and any thermal or electricity storage required would be co-located in an Energy Centre (circa 15m x30m approximately the size of 40 parking spaces).

- Following an assessment of options as part of the feasibility study, Bromsgrove School was identified as the preferred location from a techno-economic perspective (co-location of sufficient space for boreholes and Energy Centre, high heat and electricity demand nearby, soft dig between these components).

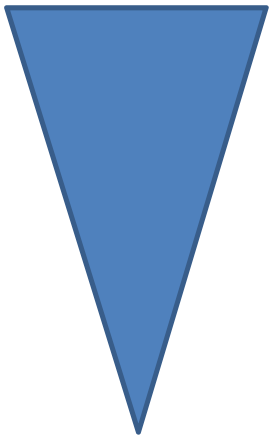
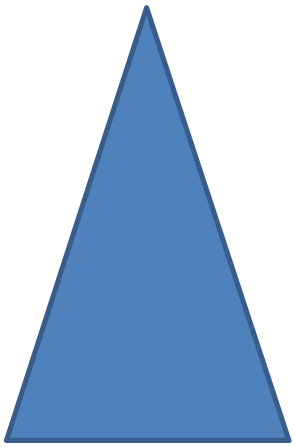
- Another option for the Energy Centre is the Princess of Wales Hospital or the Energy Centre components could be somewhat dispersed.

- During the Detailed Project Development, the merits of these various options can be considered, taking into account the results of the test borehole and Financial, Commercial and Legal considerations.

Potential Delivery Model

- Delivery models have been out of scope of work to date, which was aimed at investigating whether a heat network was technically and economically possible. A Commercial Business Case would be developed in the next stage of detailed project development, to enable stakeholders to understand the options for this project and to decide which delivery model is preferable.[6] [7]

Figure 2 Overview of potential delivery models

Type of delivery model	Typical emphasis on commercial returns	Typical emphasis on socio-environmental benefits
A.Private sector led		
B.Public-private shared leadership		
C.Public sector led		
D.Community company (CoCo)		

[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/717798/Strategic_and_Commercial_Case_development.pdf

[7] https://www.scottishfuturestrust.org.uk/files/publications/SFT_Delivery_Structures_2013.pdf

Potential Financial Model

- As an energy infrastructure investment project, returns on this investment would be based on the long term revenues from heat and power (possibly cooling in future) sold to private and public consumers by a local energy company. BDC could be involved in that investment / ownership or it could be others (including external third parties). HNDU hold a list of third parties interested in investing in heat networks[8].

- Indicative investment figures and IRRs have been produced as part of the Feasibility Study (see Fig 3 and 4), the Business Case is robust and viable unless there are large or multiple changes. However the scope of the study was technical and economic rather than financial i.e. is it likely enough that a heat network producing significant carbon savings is both technically possible and economically favourable to warrant further investigation.

- An Economic and Financial Business Case would be developed in the next stage, to enable stakeholders to understand the finance options for this project.[9]

Heat Networks Investment Project (HNIP)[10]

- The government has set up an investment programme to provide funding to enable technically and economically feasible projects that would deliver significant environmental and social benefits but where commercialisation and construction costs significantly outweigh revenue returns, meaning that return on investment is unattractive.

- A scheme with significant carbon savings and other benefits can bid for the amount of investment required to enable an IRR that will meet the investment criteria of the potential investors.

- For example, based on analysis so far, over £5 million HNIP investment could be bid for towards the Bromsgrove Heat Network, to enable an IRR of 7% for the investors of the other £15 million.

[8] https://www.gov.uk/guidance/heat-networks-overview
[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/717802/Economic_and_Financial_Case_development.pdf
[10] https://www.gov.uk/government/publications/heat-networks-investment-project-hnip-scheme-overview

Figure 3

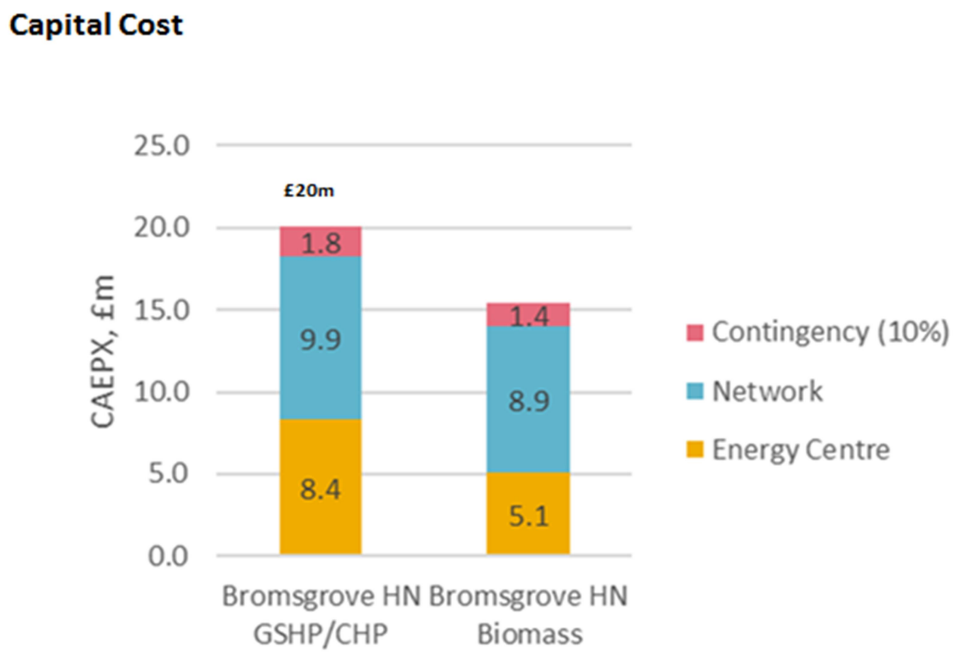
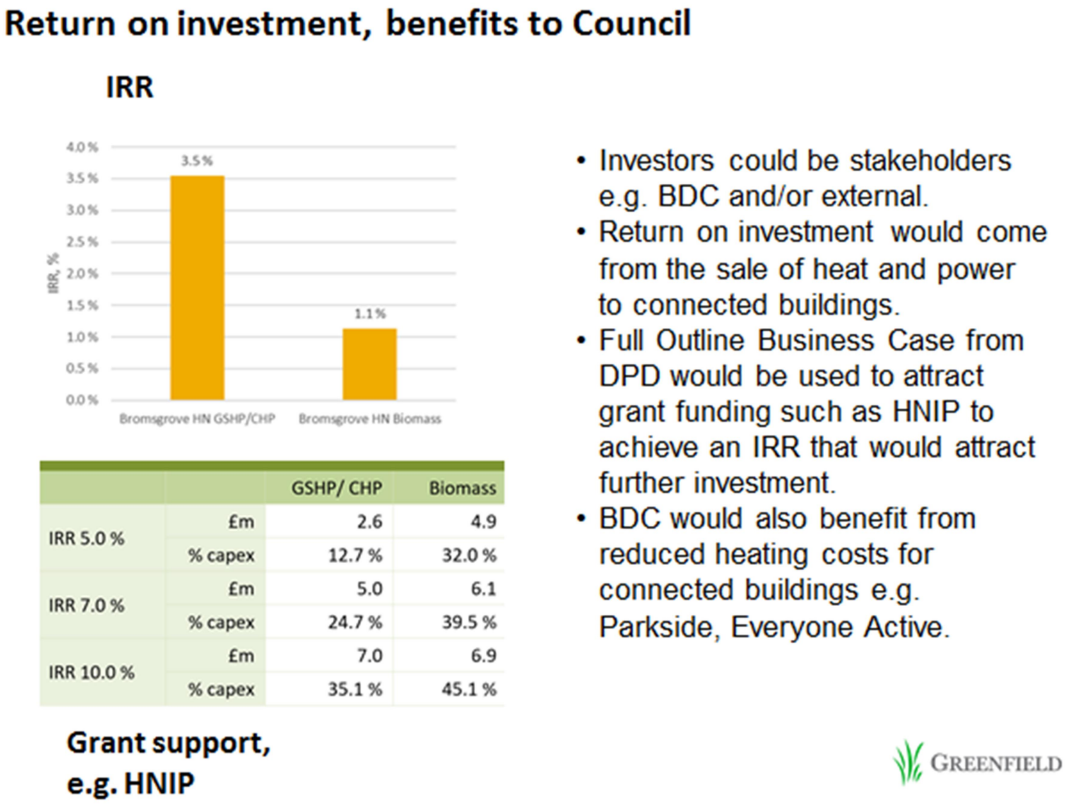


Figure 4



Funding the Detailed Project Development

Overall Budget

	Total cost	Funding split 67% 33%	
		HNDU bid	Match
Stage 1	£130k	£87.5k	£42.5k
Stage 2	£120k	£80k	£40k
TOTAL	**£250k**	**£167.5k**	**£82.5k**

Stage 1

Work element	Cost	Funding split 67% v 33%	
		HNDU bid	Match
Borehole Drilling	£70k	£47.5k	£22.5k
Technical Advice and Analysis	£60	£40k	£20k
TOTAL	**£130k**	**£87.5k**	**£42.5k**

Stage 2

Work element		Cost	Funding split 67% v 33%	
			HNDU bid	Match
Outline Business Case and detailed plan	Technical /Commercial	£30	£20k	£10k
	Financial	£60k	£40k	£20k
	Legal	£30	£20k	£10k
TOTAL		**£120k**	**£80k**	**£40k**

BDC have submitted a bid to HNDU for 67% of the total amount required, plus full funding for a Project Manager for the next stage. Approval of funding will be in April if successful, with an indicative result given before then.

Stage 1 requires an initial commitment of £42.5k from stakeholders, of which £10k has already been obtained from Bromsgrove School. Other stakeholders are considering contributing match funding. We have noted your concerns and will include a break-point after Stage 1, where Stakeholders can decide whether or not to progress to Stage 2.