Building for the Future - Government support for Good Design & Innovation

- Rufus Ford / Tim Starley-Grainger, BEIS: **11.30am & 13.30pm, 8 March**

Good Design and Innovation: Agenda

Need for innovation in heat networks

Government support to date

Overview of SBRI projects

Good Design and Innovation

Good design (followed by good installation, commissioning and operation) can:

- Lower capital costs
- Lower operating costs
- Avoid summer overheating
- Reduce consumer bills
- Increase customer satisfaction
- Facilitate lower carbon heat

Size of prize

Carbon Trust report on impact of £320m HNIP project anticipates 7.2% reduction in levelised cost of heat from 'learning by doing' – equates to several £bn by 2050

ETI estimate network infrastructure costing £75bn to connect up to 50% of UK properties to heat networks – their work suggests can reduce capital cost of heat networks by 32-45% through innovation

Examples of design and innovation from SBRI Heat Network Demonstrator project. Looking for projects applying to HNIP to integrate learnings from earlier projects and demos in order to capture benefit

Support for Innovation

Industrial Strategy White Paper –

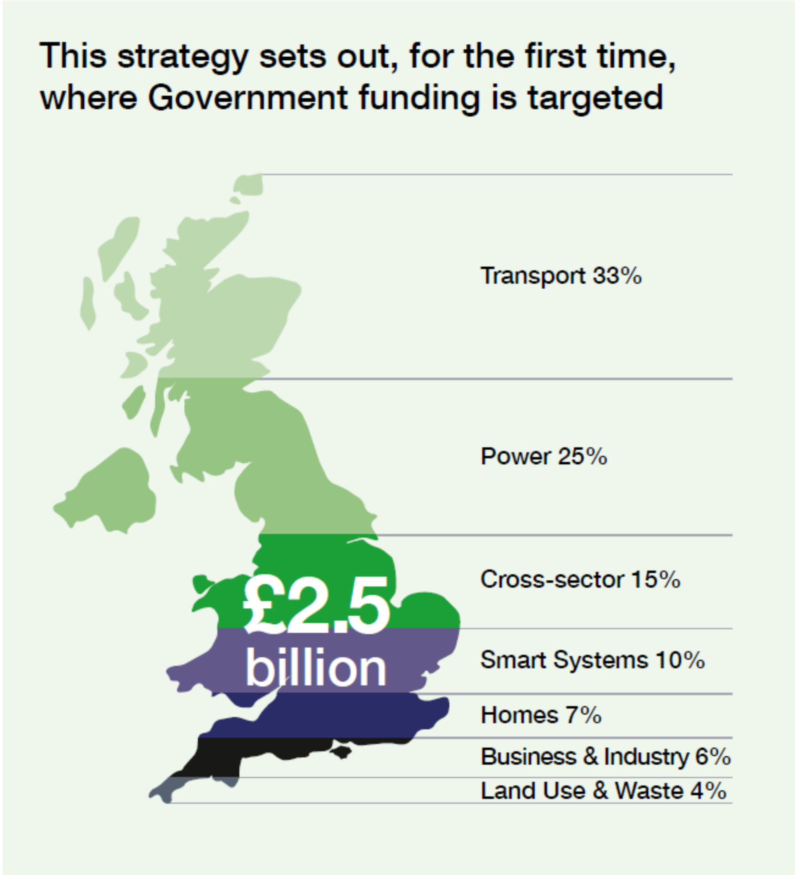
- 5 foundations including to become 'the world's most innovative economy' + 'major upgrade of UK infrastructure'
- 4 Grand challenges including clean growth

CGS set out how Government will spend £2.5bn on innovation between 2015-2021

BEIS spending £505m

DECC c£7m spent on SBRI Heat Networks Demonstrator

Energy Technologies Institute just published report following £0.5m project looking at how to reduce cost of heat infrastructure investment



ETI – Reducing Capital Cost of DHN Infrastructure

Can reduce Capex of heat distribution infrastructure by 32-45% and Opex by 10%

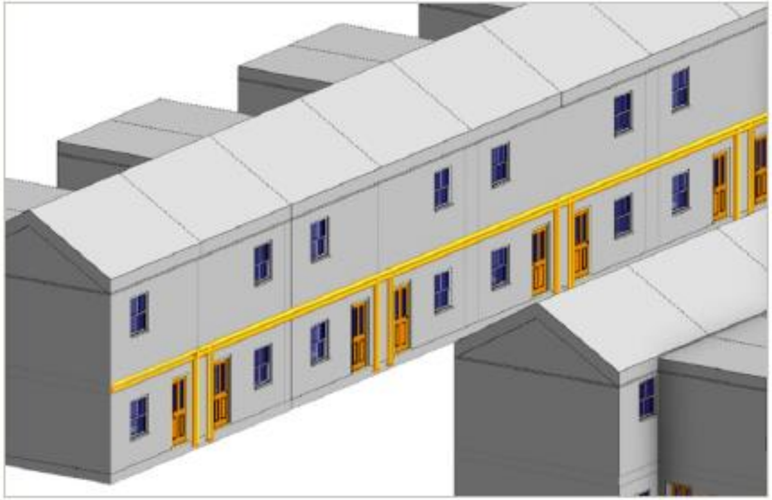
91 measures considered, 35 most promising clustered into 13 categories

8 route maps to deliver savings at cost of £10m over 4yrs

Top 5 measures

1. Trenchless technologies – 11% saving
2. Improved front end design/planning – 9%
3. HIU optimisation – 7% saving
4. Radical routes – 5% saving
5. Direct HIU/reuse cylinder – 5% saving

http://www.eti.co.uk/programmes/energy-storage-distribution/heat-infrastructure-development



↑ Figure J: Typical arrangement of external wall pipe on front elevation about doorways with entry at ground floor level

↑ Figure M: Congested DH route

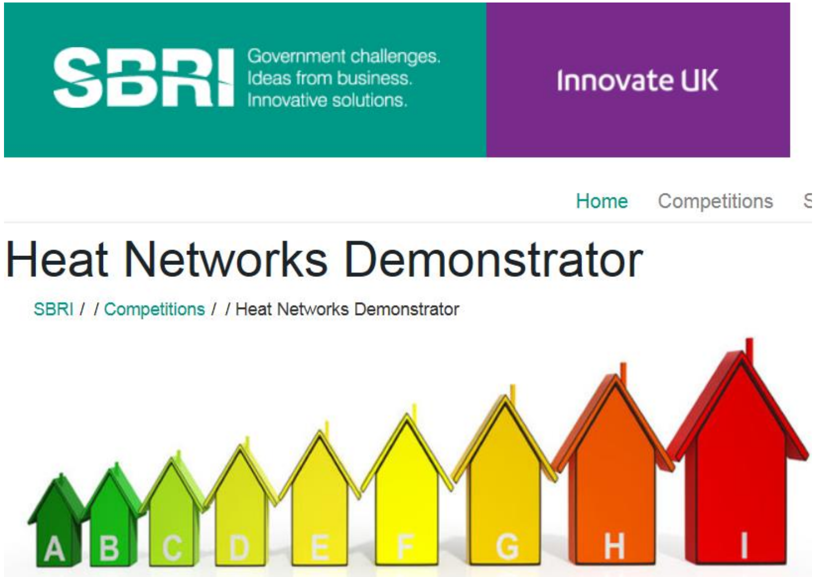
↑ Figure L: Removal of the core (Source: Tracto Technik)

SBRI Heat Networks Demonstrator

£7.5m over 3 phases
Phase 1 – 6months, 17 x feasibility studies (c£50k ea)
Phase 2 – 12 months, 9 x installation and monitoring (£120k - £1.4m)
Phase 3 – 12 months, 7 x additional year monitoring (c£50k ea)

Objectives were to:

1. support the deployment of low carbon heat networks out to 2050;
2. demonstrate the successful integration of innovative technologies and techniques on heat networks;
3. provide real world evidence on reducing costs and improving energy efficiencies;
4. improve the customer experience of heat networks; and
5. increase government’s understanding of heat network innovators and the heat network technology supply chain.



COHEAT

Retrofit 5G heat network into small housing association estate

Design for lower temperature and reduced peak demand; made use of data/instrumentation to automate commissioning and to monitor and manage performance to deliver agreed service

Lots of learning from customer acceptance of low-T networks to management of Legionella

CLEAN ENERGY PROSPECTOR

Investigating use of closed-loop GSHP boreholes for inter-seasonal thermal storage

Demonstrate long-term energy benefit from summer charging with cost saving where summer power sourced from PV. Work to optimise storage using predictive algorithms and vs. consumption (bearing in mind long-term chilling of ground where abstraction exceeds recharge).

EON

Integration of solar thermal, heat pump, PV, 2 x thermal stores in large scale HN (at Cranbrook) with existing gas boilers and CHP and thermal stores

Added 1.4MW solar thermal array, 0.9MW heat pump, 2MWh thermal storage across 2 stores

6 different modes of operation of solar thermal to integrate and optimise to give kWh, £ and CO_2 savings

Difficulties during installation meant missed summer of 2016 and had not optimised within SBRI timeframes

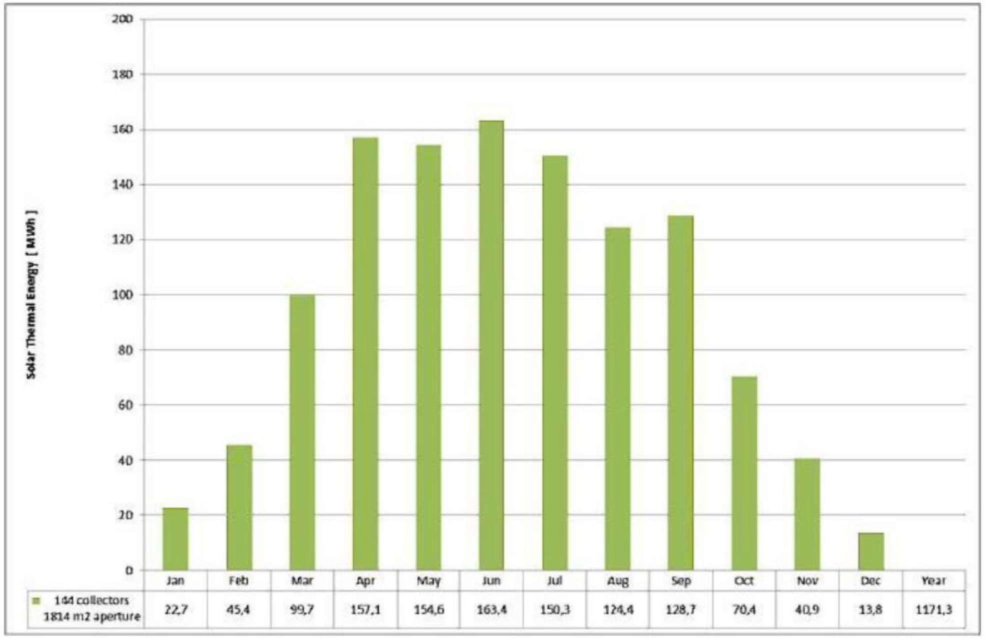


Figure 9: Predicted energy yield of the solar array

GURU

Developed “Pinpoint” software to gather data on heat networks performance

Software helps identify improvements to networks

Tested in 3 housing association networks: losses reduced by 40-50%, reduced bills for residents

Developed HIU testing regime, now part of BESA

MINIBEMS

Weather compensation controls for variable volume and variable temperature (VVVT) control. Improves efficiency of system using gas boilers, and enables low carbon sources (CHP, heat pump) to supply greater proportion of heat.

PASSIV SYSTEMS

Dynamic temperature control using system that "learns" based on building physics in customer property

Reduced return temperatures and flattening of demand peaks, providing savings to network and increased heat supply from low carbon technology.

SYCOUS

Customer service platform development to reduce administration costs and facilitate "in-housing" of CS and billing functions.

Intelligent tariffs to reduce peaks and lower return temperatures.

SBRI Heat Networks Demonstrator - themes

Use of data to optimise networks, identify faults, and suggest improvements

Smart controls and instrumentation

Lean design

Optimisation of heat networks operation

Integration of low C generation

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