UK Heat Networks: The prospects of decarbonisation through developing a heat marketplace

BIEE 2021 Conference

14 September 2021
Introduction and agenda

1. Elexon – background and outline of what we do
2. An overview of the heat sector in Great Britain
3. District Heating – sector overview
4. Heat Networks – challenges and opportunities
5. What could the future look like for heat networks in the UK?
6. Conclusion and final remarks
Elexon: who we are and what we do

Code Administration
- Industry rules management and change
- Trusted critical friend
- Dedicated customer support (OSMs)
- Training and webinars

System Operation
- 24/7 Party Management
- 24/7 Settlement
- Technology Design/change implementation
- Data Analytics & Insights

Performance Assurance
- Monitor Settlement performance and compliance
- Hold Parties to account for their performance
- Assist Suppliers in creating plans to address performance issues

Policy Support
- Impartial, expert advice/guidance
- Market scanning
- Providing support to BEIS/Ofgem to deliver policy outcomes

End-to-End Code Manager/Market Operator providing key energy market infrastructure

For BSC operations we exchange funds to the value of £2.5bn every year and £6bn in respect of EMR

We serve around 530 Market Participants
- 28 Distributors
- 114 Non-physical Traders
- 148 Generators
- 167 Suppliers

Note: Number of market participants as of June 2021.

We also calculate, collect & distribute payments to CFD generators and Capacity Market providers
GB Heat sector – An overview

GB Heat sector - statistics

- Space Heating and cooling: 17%
- Hot water: 4%
- Cooking: 2%

Greenhouse emissions are produced from Heat (2016)

- Total: 37%

Domestic heat – fuel consumption

- In the UK, gas has become the predominant source of heating, with the vast majority of customers connected to the GB gas grid.

- Gas Central Heating: 85%
- Electricity: 5%
- Heat Networks: 2%

- Heating appliances in homes (2016)

Percentage of heating and cooling from renewable sources

- 2015: 6.2%
- 2019: 7.6%

Reach Net Zero goals?

What are some alternative methods to heating?
Heating – what are some alternatives?

The UK Government has suggested that from 2025 onwards, new builds will be banned from installing gas boilers.

**Electric Heat Pumps**

- HPA: manufacturers have placed orders to deliver units almost double the amount from 2019.
- PM's 10-point plan (2020) set an ambition of 600,000 heat pumps installations per year by 2028.
- Although heat pumps incur high upfront costs they are cheaper to operate compared to combustion-based heat systems.
- Heat pumps reduce carbon footprint over time.
- Eligible for the Renewable Heat Incentive (RHI) scheme.

**Combined Heat and Power**

- Combined generation (cogeneration) can help reduce emissions by up to 30% compared to other conventional heating methods.
- CHP plants can reach efficiency ratings in excess of 80%.
- More than 2,000 businesses and sites in the UK use CHP technology.
- Natural gas is the main fuel used by the majority of CHP plants.
- Biomass fuel CHP plants could be eligible for the RHI scheme.
District Heating – sector overview

Heat Networks distribute heat from a central source to a number of connected domestic and non-domestic customers on the network.

There are over 14,000 Heat Networks in the UK serving up to 480,000 consumers. This accounts to 2% of all heat demand from UK homes, businesses and industry.

91% of Heat Networks are powered by gas.

Heat Networks are technology agnostic.

18% of heat in buildings supplied by Heat Networks if we are to achieve 2050 Net Zero goals.

Can Heat Networks help achieve these goals?
Challenges faced by Heat Networks sector in the UK

Demand
- Heat Networks remain relatively unknown amongst consumers in the UK
- Uncertainty around how many connections a new Heat Network development will attract
- Can new connections to Heat Networks be mandated?

Regulation
- No robust policy framework around consumer protection (Heat Networks as Monopolies)
- CIBSE/ADE Code of Practice (CP1)
- Heat Network (Metering and Billing) Regulations 2014

Funding/Financing
- Limited understanding of potential costs and return on investment
- Financial burden and risk for developers and investors due to complexity of market arrangements and lack of standardised documentation or shared data

How is the Government helping Heat Networks?

- Heat Network Investment Project - £320m to support development across England and Wales
- BEIS Consultation on building a Market Framework for Heat Networks (2020)
- Heat Networks (Scotland) Act 2021 – regulate supply of thermal energy, construction and operation of Heat Networks
The UK Government has been consulting with industry on building a new Market Framework for Heat Networks.

- Ofgem as the Heat Networks regulator, giving customers access to similar protections as other energy customers.
- Ensure developers and investors have the tools to establish new Heat Networks and expand existing ones.
- All Heat Networks become low carbon by 2050.

### Regulation

1. Protecting the interests of current and future consumers and setting guidance relating to:
   - Provision of information to improve transparency
   - Pricing
   - Quality of Service
   - Proposed Regulatory model: General Authorisation with optional licence for rights and powers

### Local Approach

2. ZONING

   Defining local areas based on a suitable heating strategy

### Decarbonisation

3. Consumers should be aware of the low-carbon heat sources they use
   - Future Homes Standard
   - Regulation of Decarbonisation
   - Waste-heat sources – encourage commercial and industrial sources of waste heat to connect to local Heat Networks

---

Energy White Paper, 2020
There is a lot of potential for Heat Networks to contribute towards spreading low-carbon heat across the UK.

- Heat production and distribution are integrated.
- Heat Networks are disparate and not connected to each other.
- The way heat is distributed and supplied resembles the gas and electricity markets.
- What about the case for unbundling the Heat Networks sector?
- Competitive Heat market
- More consumer choice
- Competition enhanced by interconnection.
- Third-party access (TPA) explored in European nations.
Interconnection of Heat Networks across areas in the UK could bring a number of benefits to the sector

Back in 2014, the Mayor of London office started to explore the potentials of interconnected Heat Networks

Connected directly and share Heat Network supply water, or be hydraulically separated with a heat exchanger

ADE’s Shared Warmth report (2018) noted that the regulatory framework should be designed to allow interconnection of Heat Networks

Benefits of interconnected networks

Interconnection could allow a heat marketplace to be established enabling competition and lower costs

Greater security of supply due to multiple heat sources supplying the same network

Extract more value from existing energy centre assets and other stranded assets

Greater use of more efficient plan can be made, reducing emissions and lowering carbon emissions

Creates incentives to connect network heat supply to energy waste plants

BEIS Consultation on building a Market Framework for Heat Networks (2020)
Lessons learned from the electricity industry

It is expected that the Heat Networks market will **grow significantly** over the coming years and **competition** could be introduced.

**Background**

- **2001**
  - New Electricity Trading Arrangements (NETA) came into force in England and Wales

- **2005**
  - NETA was extended to Scotland to establish the British Electricity Trading and Transmission Arrangements (BETTA)

**Should the Heat Networks sector open to competition, a number of ‘tried and tested’ electricity market design principles could be applied to the future heat market.**

- **Central Settlement of heat**
  - The creation of a competitive heat market where heat could be produced, transported and sold on a market price basis similar to how electricity and gas markets work

- **Assurance of Settlement/Data**
  - Inspection and assurance of meter readings from Heat Networks to ensure data entering heat Settlement is accurate

- **Assurance of Metering Systems**
  - Ensure Heat Network operators are using metering equipment that has been certified under technical standards and sector guidelines

- **Code development and management**
  - Development of a new code specific to the technical standards around the development and operation of Heat Networks
  - Mandating and administering the current CIBSE/ADE CP1

**Future Market Arrangements**

- **QUICK WIN**
  - Development of a new code specific to the technical standards around the development and operation of Heat Networks
  - Mandating and administering the current CIBSE/ADE CP1
## Conclusion and final comments

<table>
<thead>
<tr>
<th>Decarbonisation</th>
<th>Future of Heat Networks</th>
<th>Multi-vector policy Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>37%</strong> Greenhouse emissions are produced from Heat (2016)</td>
<td><strong>2%</strong> of heat demand is covered by heat networks</td>
<td>Technical and operational similarities between <strong>heat</strong> and <strong>gas</strong> and electricity</td>
</tr>
<tr>
<td><strong>7.9%</strong> Percentage of heating and cooling from renewable resources</td>
<td><strong>What about the case for <strong>unbundling</strong> the Heat Networks sector?</strong></td>
<td>Some tried and tested design principles in the electricity sector could be applied to heat networks</td>
</tr>
</tbody>
</table>

### A mix of new technologies and approaches be needed to achieve the 2050 net zero target

- Existing and new heat networks should be encouraged to develop and expand to benefit from a competitive heat marketplace
- Any policy should be future-proofed, incentivise efforts towards decarbonisation targets and be able to facilitate a whole-systems perspective.

### Future of Heat Networks

- Only **2%** of heat demand is covered by heat networks
- Competition enhanced by interconnection

### Multi-vector policy Framework

- Technical and operational similarities between heat and gas and electricity

### Heat and Buildings Strategy

- Existing and new heat networks should be encouraged to develop and expand to benefit from a competitive heat marketplace
- Any policy should be future-proofed, incentivise efforts towards decarbonisation targets and be able to facilitate a whole-systems perspective.

[https://www.youtube.com/watch?v=unuRwEBG24I&t=2s](https://www.youtube.com/watch?v=unuRwEBG24I&t=2s)
THANK YOU

Thomas Demetriades

Thomas.Demetriades@elexon.co.uk

14 September 2021