Current and planned District Heating developments: Future vision for the UK

Mike Tisdell, Heat Policy Manager

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Heat Networks

ADE: Heat Networks represents over 90 organisations in the heat network sector

ADE was first established in 1967 as the District Heating Association. We have been pioneers in this sector for almost 60 years.

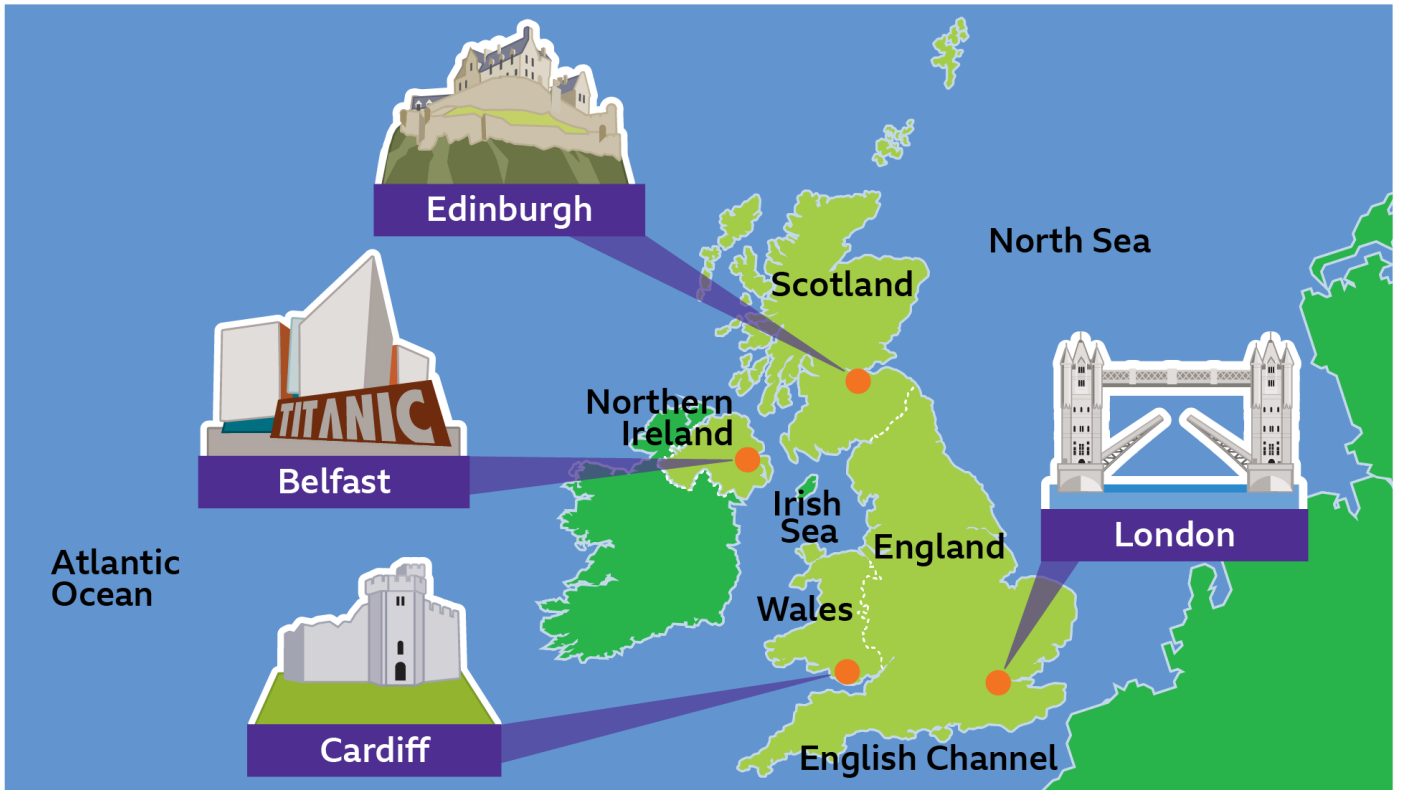
Our members range from heat network developers and investors, heat pump suppliers, pipe and insulation manufacturers, heat metering and billing companies and contractors through to local authorities, housing associations and non-profits.

Our broad membership base makes us the go-to trade association for heat network companies and gives you a powerful voice to Government.

View a full list of our members here.

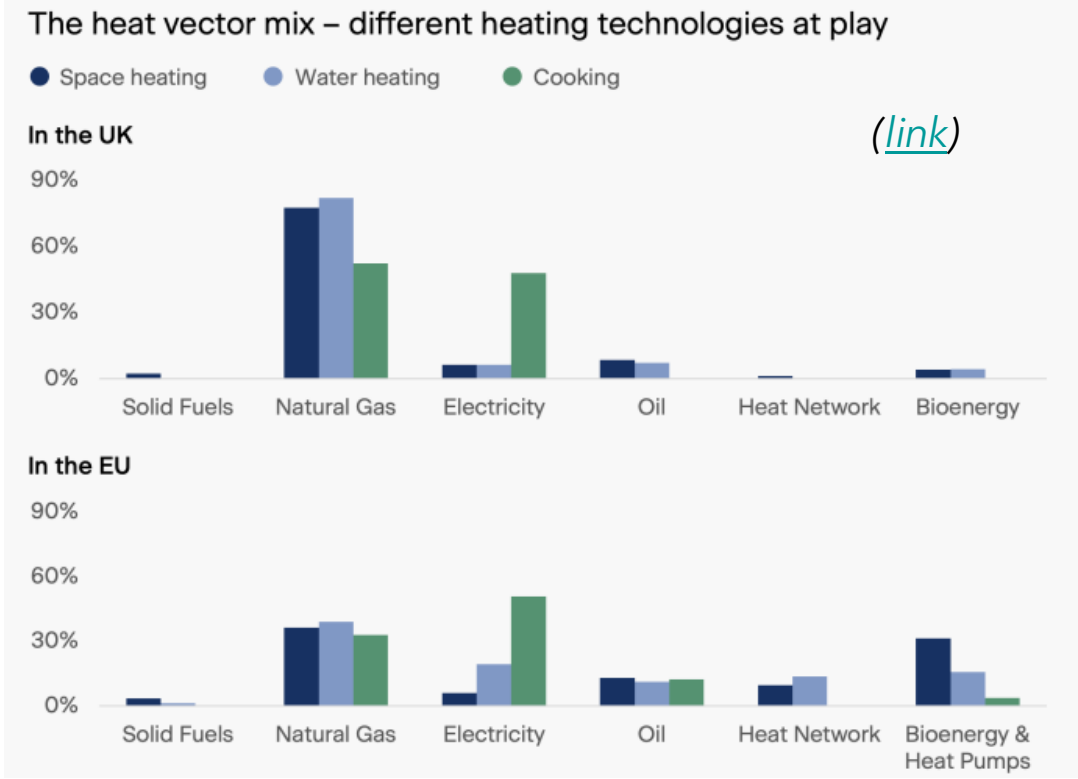
The UK: 4 Nations

- The UK is a nation of 4 countries, with some autonomous powers over energy policy in Scotland, Wales, and Northern Ireland.
- Scotland has significant potential for district heating, given its colder climate and greater prevalence of (historic) higher density housing stock
- The most important policy for delivering district heating in the UK (Heat Network zoning) is England-only, as are the most important funding opportunities.
- ADE Heat Networks is based in London, very close to the UK Parliament
- The UK in general is often claimed to be 'the most centralised nation in Europe' – it has very weak and fragmented municipal or local government.



The UK: Current Context

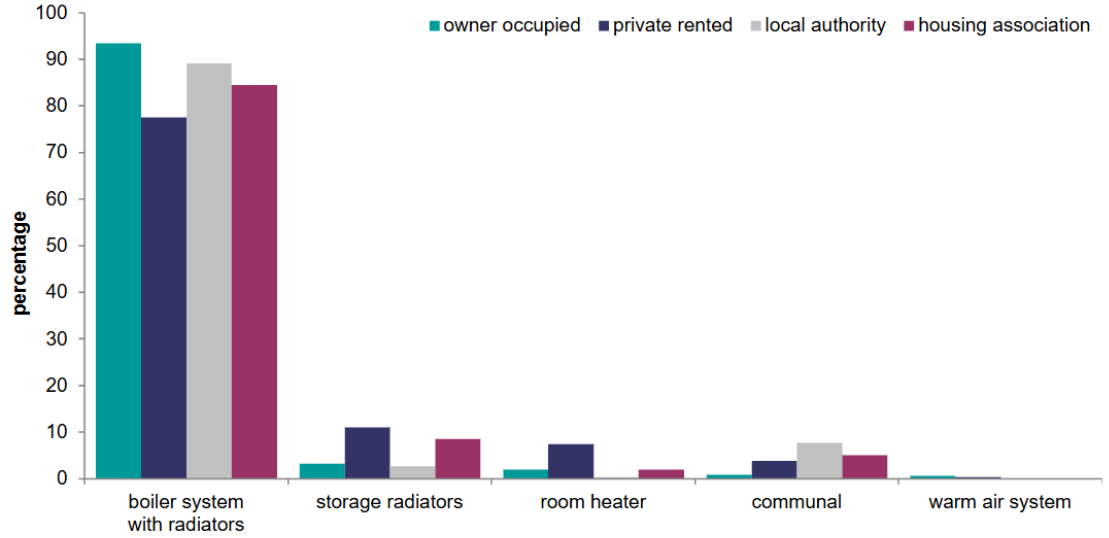
- The UK has little history of large-scale district heating.
- Heat Network market currently relies upon new developments (esp. in London) & this is reflected in the scale of most systems.
- Heat Pumps (esp. air-source) are the most common technology for new district heat networks today and gas CHP is no longer supported.
- 85% or about 24.5 million homes (and over two million businesses) are supplied directly by the mains gas grid.
- The UK has a very high electricity to gas price ratio ~4:1 which makes electric heating uncompetitive on cost.
- Bioenergy is very limited and biomass is not expected to have as big a role in district heating as in e.g. the Scandinavian countries.



(link)

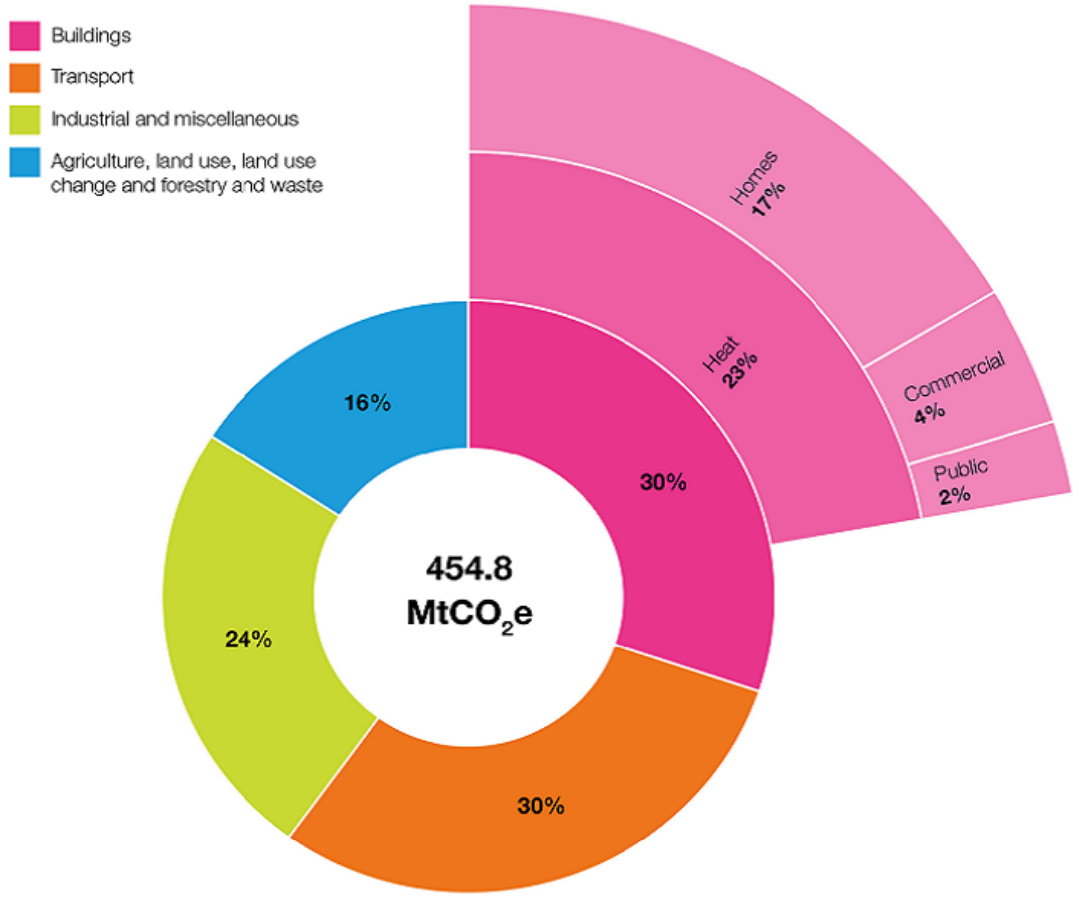
Figure 2.1: Space heating, by tenure, 2021

(England only link)



The UK: Role of Heat Networks

- District Heating has been identified as an important technology for decarbonising heating. There is an aspiration for 20% of total UK heat demand to be met by heat networks in 2050 (from ~3% [w/~0.5m households] today)
- District heating will be particularly be focused on commercial and public buildings in areas of dense heat demand.
- The most important technology for most UK domestic demand are air-to-water heat pumps [ASHPs] (replacing gas boilers)
- At present both individual ASHP systems and new low-carbon heat networks are supported by Capital grant from government (Boiler Upgrade scheme ~€8500 per household, Green Heat Network Fund <50% Capex)



Department for Energy Security

Why are low-carbon heat networks important?

- In **densely populated areas**, low-carbon heat networks are often the cheapest low-carbon heating solution.
- There are **significant constraints** to alternative measures such as air-source heat pumps for historic and/or listed buildings. Many buildings can only decarbonise with low-carbon heat network connections.

- Heat networks, using thermal storage, are better at **smoothing electricity system demand and reduce peak energy requirements,** compared with multiple air-source heat pumps delivered at an individual building level.
- This will **reduce the overall costs** of transitioning the electricity system to meet net zero.
- This will reduce the need for **electricity grid capacity expansion works**, where we are currently seeing backlogs.
- At a **national level** less transmission and generation investment will be required. This will **save businesses and households money**, given they ultimately pay for these works.

Heat networks bolster energy security by **using sources of heat that would otherwise be wasted**– such as heat from industry, rivers and canals, or geothermal energy. Using this heat means the UK will need less gas and electricity overall for heating and reduce our exposure to energy price shocks.

Department for Energy Security & Net Zero

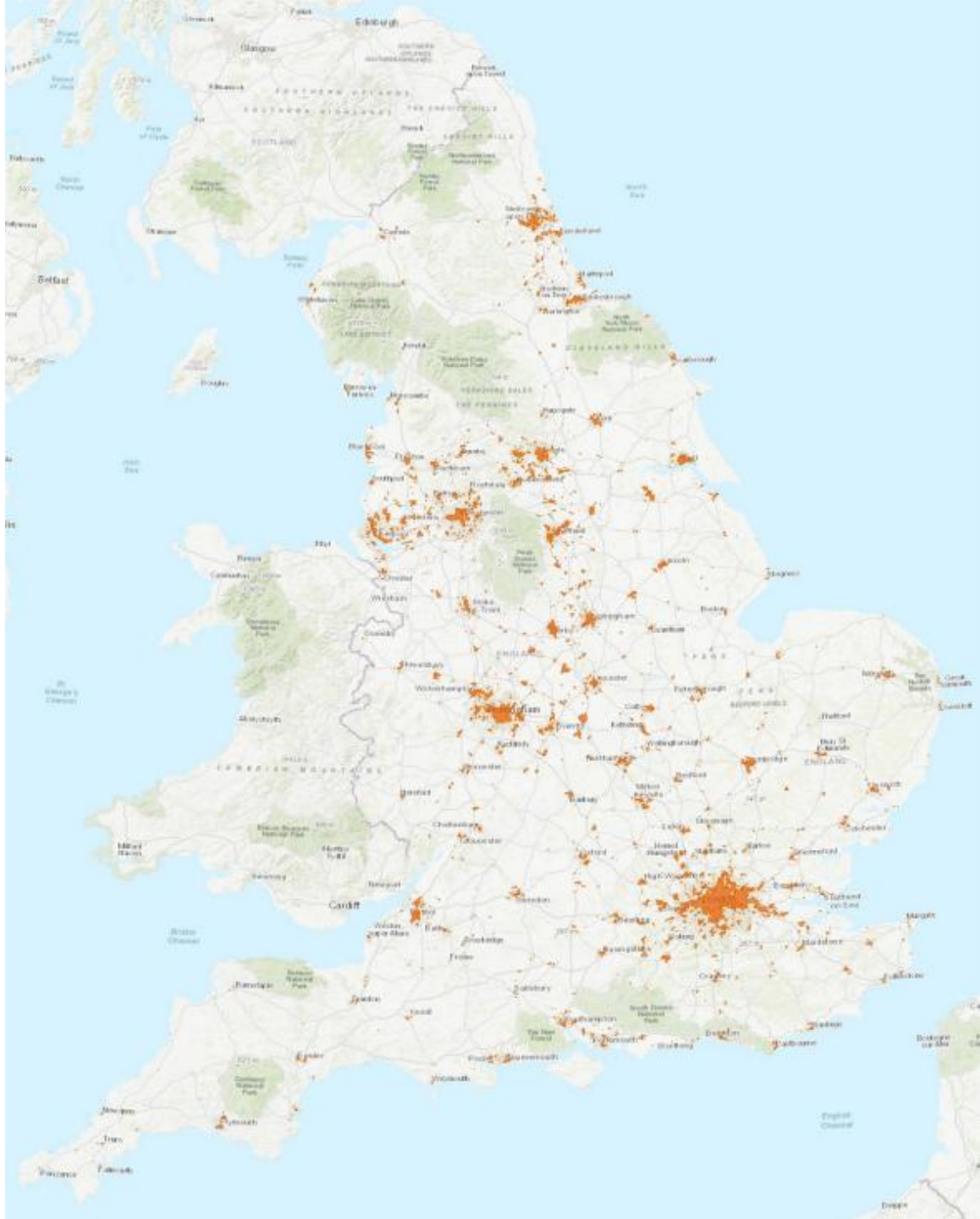
Introduction to heat network zoning

Heat network zoning is the process of identifying and designating areas as heat network zones and then developing heat networks within them.

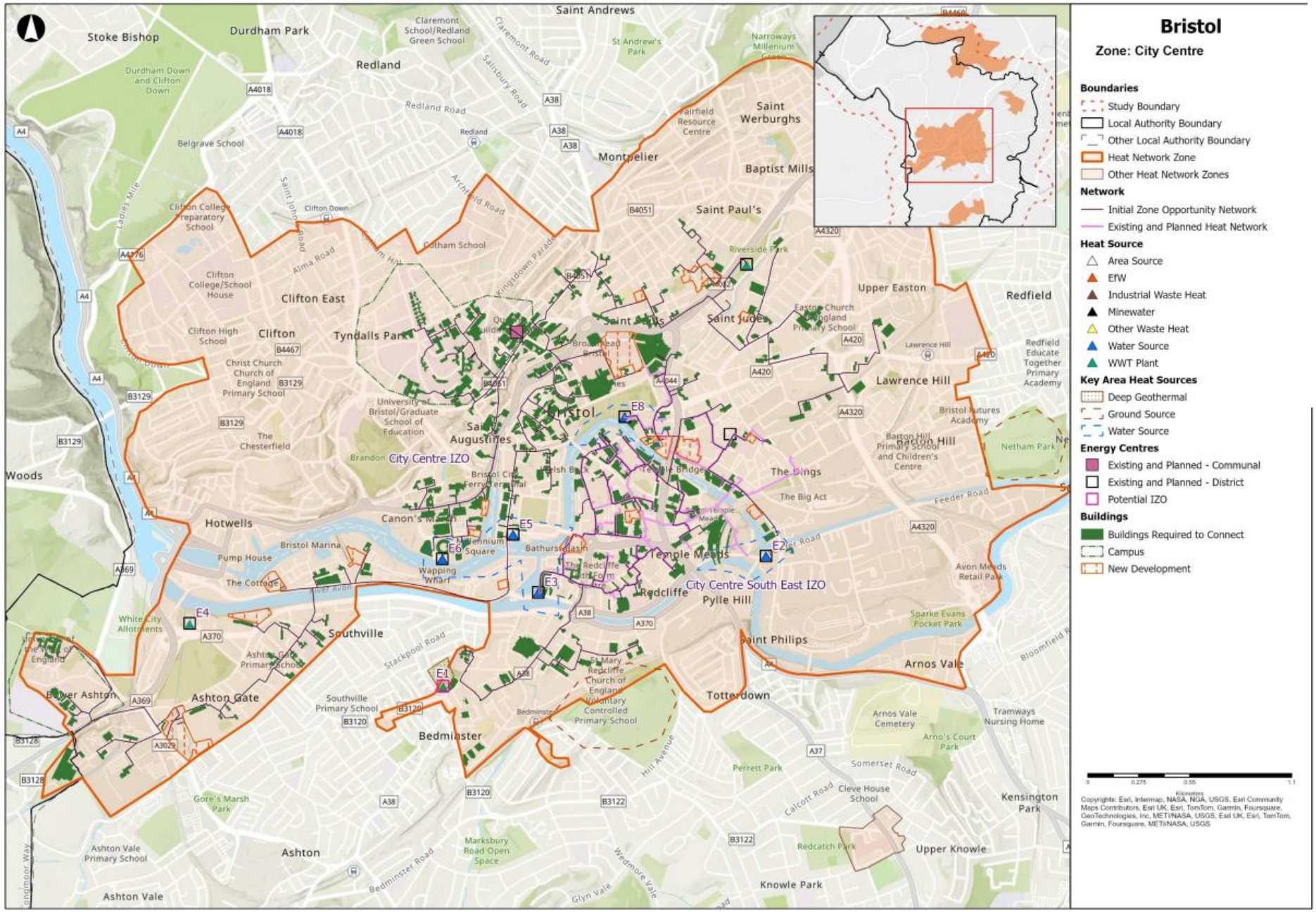
- Zoning aims to **mitigate risks** related to the construction and operation of new or expanding heat networks. These risks currently make it harder and more expensive to invest in heat networks, and limit potential for growth.
- Making it **quicker, easier and less risky** to build city-scale heat networks will enable the sector to grow rapidly and deliver on energy security and net zero commitments affordably.
- A standardised national methodology will help **identify areas** which can be designated where heat networks will be the lowest cost low-carbon heating solution.
- Zoning will provide clarity on where heat networks will be the best solutions and clarity as to the **roles and responsibilities** of organisations at the national and local level.
- It will establish new zoning bodies and a process for engaging stakeholders, allowing for better long-term planning and coordination, faster roll-out of networks, and lower costs.

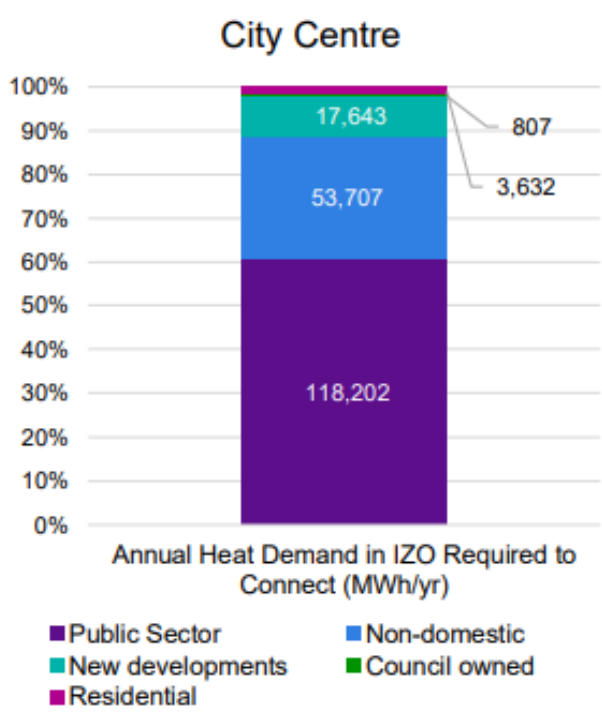
Heat Network Zoning (England)

- Heat Network Zoning is intended to be the primary route for delivering district heating.
- Central UK government identifies areas (using a computer model) where analysis indicates that district heating is lower cost than individual ASHPs.
- It grants a successful developer (which will typically be private sector but could in some cases be public-private partnership) effective enduring monopoly status over an area.
- It will place a requirement to connect to district heating on 3 building types (large non-domestic >100MWh/yr, new developments, and existing communally heated).
- It will include a (decreasing) carbon limit (likely 83gCO2e/kWh)



Heat Network Zoning model (Bristol)





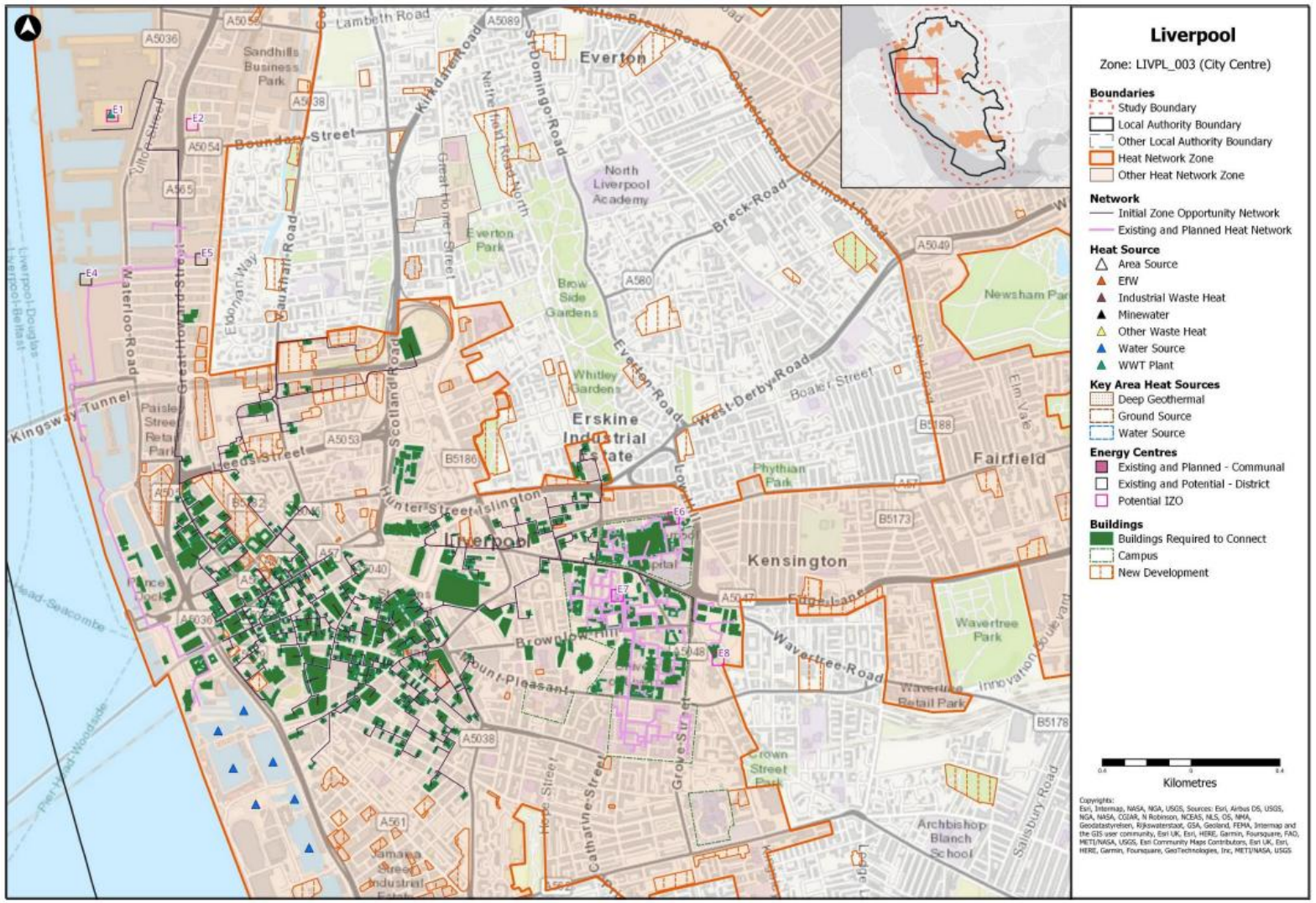
- The Zoning Opportunity reports show how the government's zoning model is identifying potential areas for district heating.
- Link here to see some early outputs

Zone refinement and policy detail

Further work on zoning identifies a number of issues, including:

- How do we fairly deal with planned and built heat networks?
- What available heat sources could be made use of and how can we best influence this?
- What is reasonable cost for customers, in a context where we will mandate connections?
- What should we expect in return for the exclusivity/monopoly powers that zoning creates.
- What is the right route to market and delivery model?

Figure 6 Initial Zone Opportunities in Liverpool City Centre HNZ



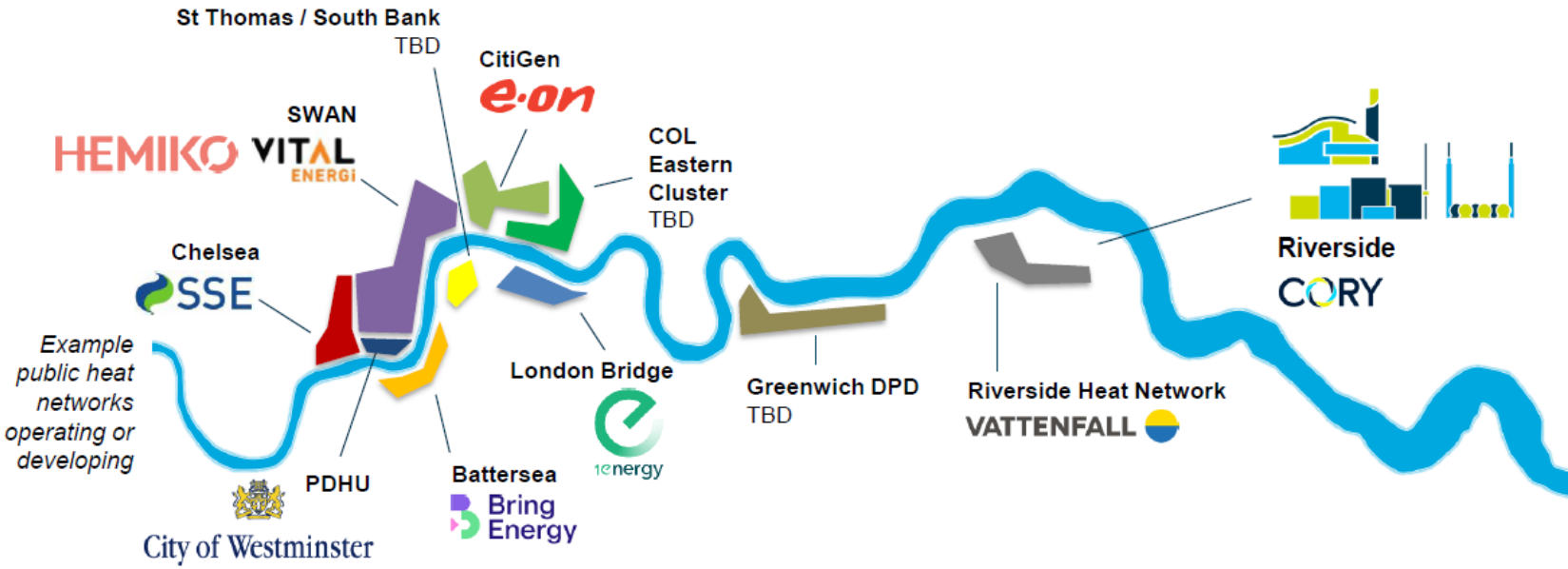
Market Framework

- Alongside the introduction of Heat Network Zoning, the UK government is bringing forward two key supporting policies.
- **Consumer Regulation**, which will give consumers equivalent protections to other energy markets (i.e. gas and electricity)
- And **Technical standards** (though the Heat Network Technical Assurance Scheme – HNTAS), which is intended to set minimum levels of performance for ALL heat networks (new and existing).

- More work is required to ensure **consumer confidence** in heat networks, as well as to mature the UK market and supply chain.
- Skilled workers and (re-)training is a particular issue.
- Work is underway on delivering a licensing regime for heat network operators, which will ensure heat network developers have the rights to deliver infrastructure (like installing pipes in the roadway, or across railways).

Key Challenges in the UK market

- High cost of Capital (low investor confidence)
- High cost of heat from networks
- Low utilisation of waste heat
- Weak planning of energy infrastructure and lack of coordination across energy system
- Low expertise and lack of capacity in (local) government
- Break down on political consensus re: net zero & decarbonisation
- Remaining questions on consumer confidence and political acceptability (with reference to the performance of privatised monopolies in England – e.g. water or rail)
- Emerging large-scale innovative (in the UK context) projects like Cory's heat transmission (right) are important to maturing the market.

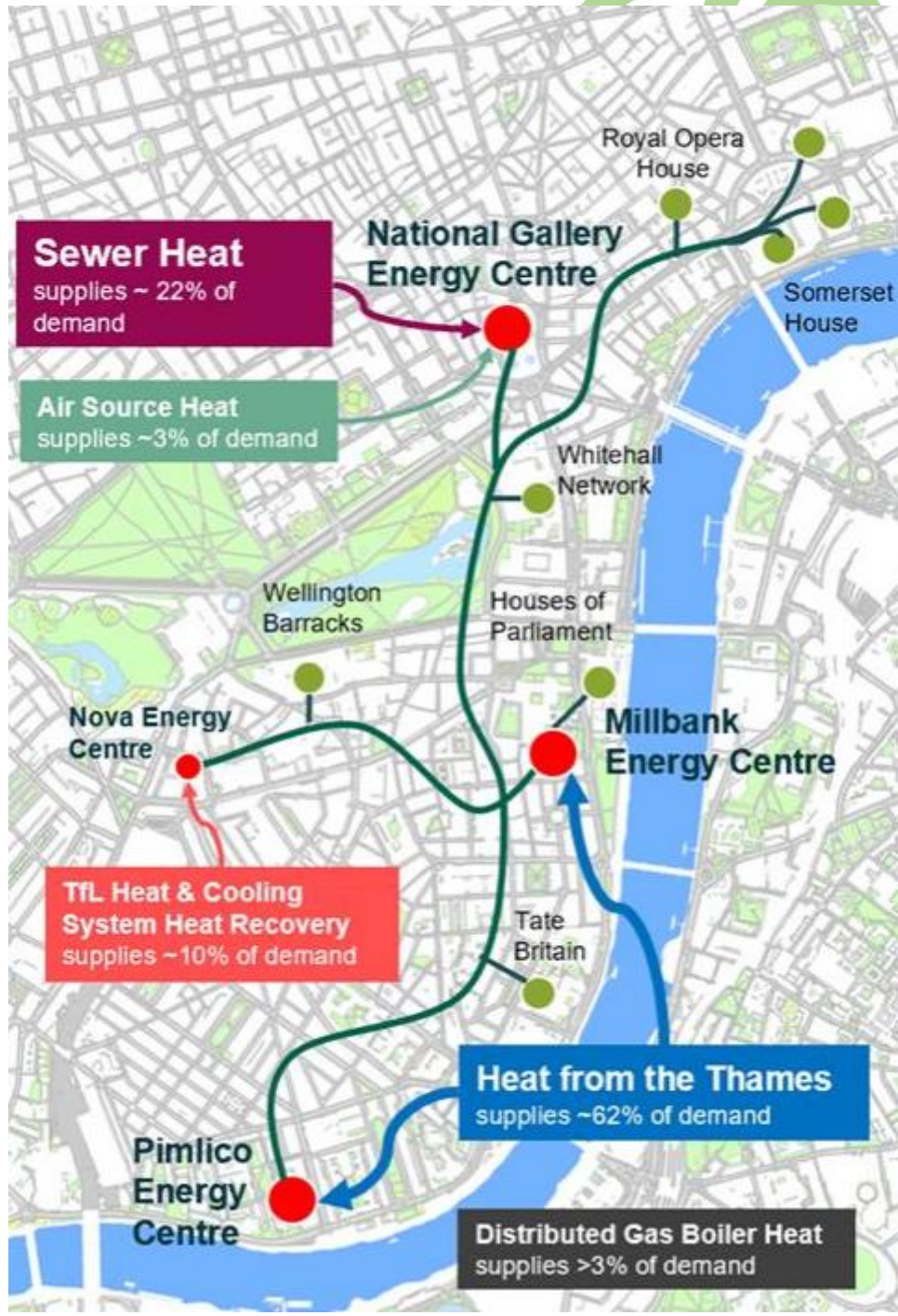


Projects in the UK:
South Westminster Area Network

- SWAN will become one of the largest heat networks in the United Kingdom. It has been identified by DESNZ as a heat network zone.

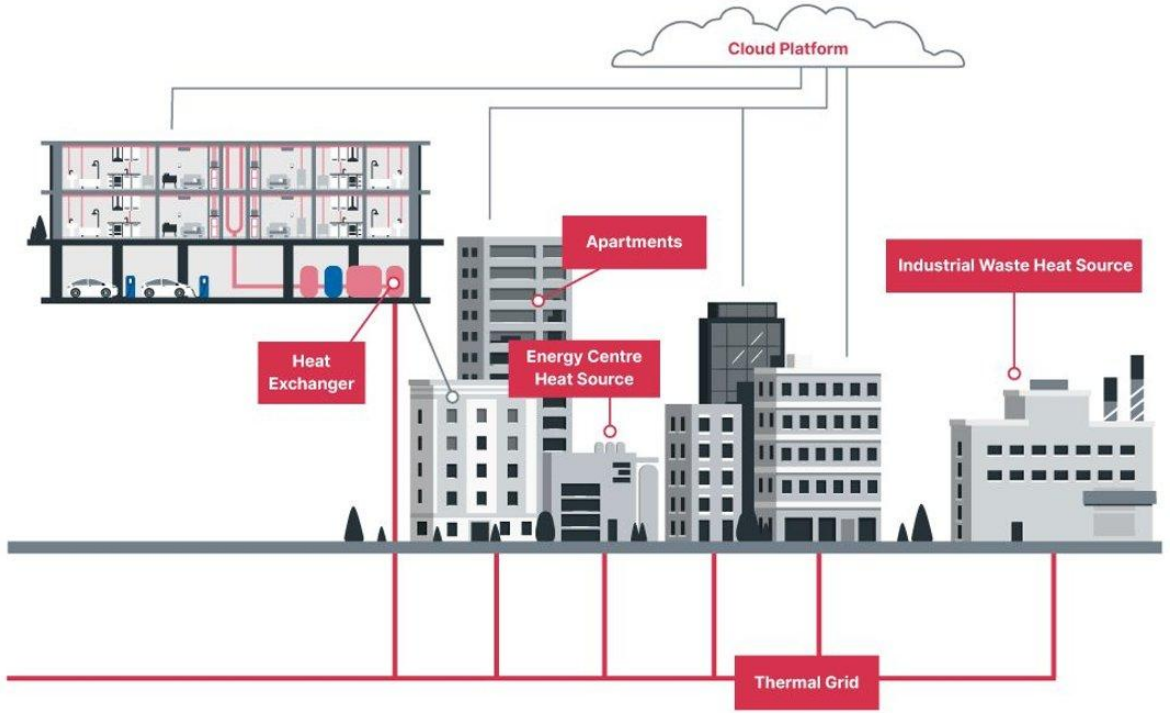
- The SWAN Partnership will be funding, building and operating the heat network. They plan to invest £100m within 3 years, £500m within 10 years, and £1bn by 2050.

- Over time, this significant new investment is expected to save 75,000 tonnes of CO2 every year, (equivalent to removing 40,000 cars from the road), create at least 500 direct jobs and more within the supply chain, improve local air quality by reducing nitrogen oxides emissions by 99%, and create 100 opportunities for UK businesses.



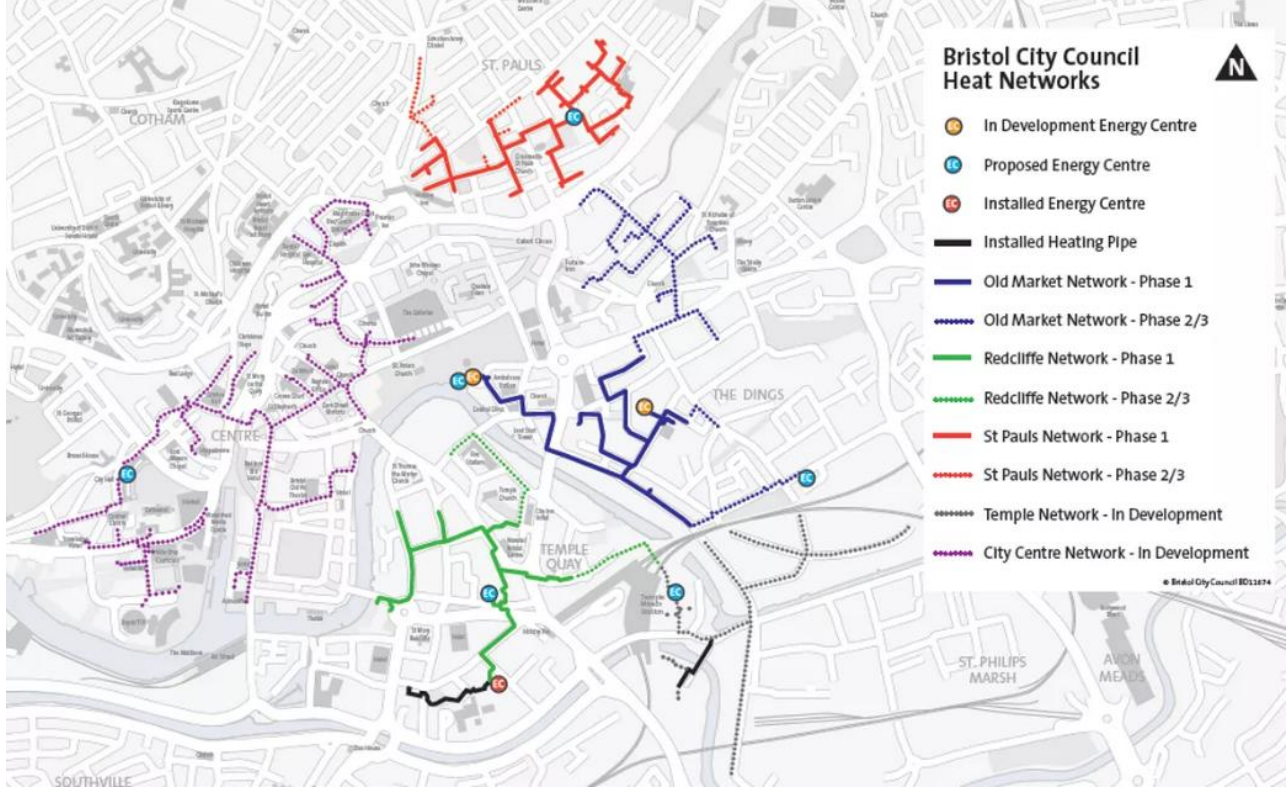
Projects in the UK: Silvertown Ectogrid

- When complete, Silvertown will be the largest ambient heating and cooling network in UK.
- It will supply the 760,000 sqm Silvertown site, which will contain around 6,300 homes and non-residential demand (offices, stores, restaurants, bars and a water sports centre)
- A central ambient loop (maintained at ~25C) is connected to in-apartment heat pumps to form a communal heat network at building level.
- 40GWh of heating and cooling is expected to be delivered, with flexibility to expand further.



Projects in the UK:
Bristol Heat Network(s)

- The networks currently have the equivalent of 11,500 homes connected across 23 residential and 16 non-residential buildings.
- The Caste Park Energy Centre holds the UK's largest water source heat pump (3MW)



Type of cost	Heat network	Building level solution
Upfront connection costs (£ / kW of heating capacity)	Ranges from £1,000 to £2,115 /kW	Ranges from £900 to £4,000 /kW
Blended running costs (total annual bill including O&M, REPEX, fixed tariff & variable tariff)	27p / kWh / yr *(simple average)*	27p / kWh / yr *(simple average)*
40-year levelized cost of energy (heating and cooling)	36p / kWh / yr *(simple average)*	38p / kWh / yr *(simple average)*

Questions?

Mike Tisdell, Heat Policy Manager
mike.tisdell@theade.co.uk

ade
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